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WHAT IS MENTAL, WHAT PHYSICAL:

THE CONCEPTS FUNDAMENTAL IN THE SCIENCES

("Qualities," Properties, "Space").

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INTRODUCTION.

A Philosophy of Science must determine the fundamental, *irreducible* universe-magnitudes; and then show how, *given these, all* other existents arose,—how, *inter alia,* consciousness was involved in that "given;" how it arises accordantly though disparately, in all individuals (particularly parents and offspring); how it arises in and "acts" upon nerve-substance; why it has the congruity and "rationality" introspectively observable; why it becomes differentiated into a "mental" and an "object" series, etc. To these questions, these *and previous* chapters, give definite answers, in the conviction that if we start from the data and with the methodology of the sciences, we find we know far more than the philosophers allow.

For most, the irreducibles are: "matter," motion, space, time—*and* "Mind." These are (I try to show) fundamentally one: *Substance* (including matter), of which all energy we know, is disequilibration-aspect, —harmonization of *all* knowledge, mental and physical alike, on basis of monism (a *genetic* monism) of substance. And in this chapter-series, it is shown, cumulatively, that *mind itself* is unintelligible, save as function of a Something-not-itself; and that "space" is mere empirical mental elaboration. But antecedent to determination of irreducibles, is the methodologic question, How are we to determine them, which raises the prior one of the nature of mind and its relations to the epistemologic avenues termed sense-organs,—relations, immediately to body, and ultimately to the extra-corporeal existents.

"Metaphysics" is in disrepute, because two things entirely separable, are habitually confused: The methodology of the metaphysicians, and the subject-matter of metaphysics. The latter may (for all me) deserve the obloquy heaped upon it, but from the subject-matter of metaphysics, we can never get away; "a body falls 16 feet in 1 second",—we are in the midst, *matter, motion, space, time, knowledge!* But nothing requires that here suddenly we abandon scientific methodology and take to scholastic ways. For, if the desideratum is a solution accordant with, and accounting for all facts (a scientific solution) merely, and not one which shall over and above that serve ulterior purpose (as, religious-"moral" propaganda), then, the questions involve nothing for

[1]Previous chapters bearing title, *Chapters for a Biological-empirical Psychology,* published: Chaps. I-III, *Amer. Journ. Psychol.*, 1909, XX, 60-106 (to which references between 60 and 106, relate): Chaps. IV-V, New York, 1910, pp. 1-24 (to which references between 1 and 24, relate). For convenience of future reference, page-numbers are here begun, arbitrarily, with 200. Manuscript copies of present chapters, deposited in libraries of: Harvard University, June 8, 1911; Aristotelian Society (London), about November 1; Yale and Chicago Universities, 1912.

which the ordinary methodology of science does not suffice; they are mere problems of psychology and physics, for whose definitive solution, ample experimental data are available.

Thus, as scientific men, we cannot avoid psychophilosophy. For, though constantly striving to write our *results* in terms of the extramental universe-constants, properties-constitution, our *observations* are all the while, being made in *mental* terms (largely of "qualities," *i. e.* our sensations). Whence, *en route* to final-scientific (penultimate) solutions, we must, perforce, ascertain what values these terms have, and by what standard we are to appraise them.

The present wide divergence between the sciences, psychology and philosophy, indicates that foundation theory is awry. Two notions in particular, appear false: That the distinguishing mark of physical from mental, is "extension;" that consciousness is *irreducible* existent ("entity"). *As Entity,* consciousness has ever been the *bete noire* of science, the Widow's Cruse whence might issue more than went in, precluding knitting up of the organismal conservation-equation on basis of either exclusion or inclusion of the consciousness-values. But innumerable facts proving that organismal energies accord with the conservation of energy, consciousness as entity, becomes virtual *reductio ad absurdum.*

And that view is further discredited by the failure of two millennia of philosophers with consciousness unquestioningly accepted as entity, to give adequate account of universe-problems (matter, mind, knowledge), and make of consciousness aught other than the Great Exception; which failure proves (as far as cumulative evidence forces probability of a negative) it either such Exception, or else not entity,—but before it is held such Exception, it must be proved entity.

Now, the pith of Chapters I-III, is that consciousness is not entity. There, is shown a possible way in which mind may interact with body, in accord with the conservation of energy. For, while with practically every other conductor, electric resistance increases with temperature, with carbon it decreases; and carbon is known to carry this anomaly into at least some of its compounds (65). Whence, as the electric current passing against resistance, results in emergence of heat, which reacts upon the carbon conductor, reducing its resistance, so "nerve"-energy passing against resistance, results in emergence of consciousness, which *re*-acts, reducing the resistance of the nerve (carbon) substrate (79). Thus is accounted for the effect of "habit", the better conduction upon subsequent, than upon initial stimulation. More important still: Consciousness being homologue of the heat emerging in the electric circuit, application of the electric-heat formula (C^2r), to elucidation of the psychophysical relation, results in accounting for the *quantitative* anomalies in the interchange of consciousness with other energies,—that *in forma* thought, it interchanges on an inconstant basis of equivalence (law of lapse, 85 note 2); that *in forma* sensation, it interchanges on a *logarithmic* basis (Fechner's law, 88-91). But it is corollary that consciousness is not entity, but *two-factored resultant.* And in Chapter V, the case of consciousness is shown to be no unique one, but only one instance of a universe-wide mode of origin, origin *through interaction,* as Critical Phenomenon (5).

But the psychology which shall together with physics, prove capable

of replacing the regnant heirloom-metaphysics, must be one able to offer complete (if, indeed, theoretical and perhaps only tentative) solutions of crucial problems, especially those concerning the relations of mind with environment. Whatever, now, may prove its defects, at least the present psychology fulfils this requirement. For, of crucial problems, two are all-fundamental: The psychologic crux, the nature of the psychophysical relation (physics of the brain-mind, mind-brain transition); the philosophic crux, the source of the subject-object antithesis. Of the first, a possible, complete solution was given in Chapters I-III; while to the second, this Chapter-series answers: No independent problem in its lowest terms, is involved; the questions are partly those of the first problem (*parte* sensation-genesis), partly are the problems of the nature of noumena, and their effects on the conscious organism, especially those which inverted (into experiences *of the organism with* noumena), involve objectivation of the percept-series (Chapter VIII).

The line of thought and argument is connectedly summarized in the chapter-headings and the closing section.

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CHAPTER VI

"SECONDARY QUALITIES."

Epistemologic significance of sensation as two factored; experience is transcended, revealing external world.

Notion that things have attributes other than properties. Difference between thing and object. "Secondary qualities:" If in subject, synonym for sensations; if in thing, for properties.

I. They are *not demonstrable in things,* for: Possibility of affirmative evidence is excluded by refluents being demonstratedly not qualitied; whence quality-conditions on *jenseits* of refluents, cannot be known. Quality-in-thing-ism self-stultifying through necessity of appeal to subject's experience as sole criterion of quality.

II. They are *demonstrably not in things,* for: Likeness and difference of qualities bear no relation to affinities of things, and magnitude of change in qualities, none to magnitude of change in things; qualities of compounds bear no relation to qualities of constituents; were qualities in things, they would be domonstrably synonym for this or that property; the quality differs with different observers and with different conditions of same observer; difference of qualities does not involve difference of things, or sameness of qualities, sameness of thing; things have direct relation not to color (and qualities generally), but to wave-length, which relation cannot explain distribution in spectrum, of subject's color-vision, explanation of which forces admission that a thing does not reflect long waves because it is red, but is "red" because it reflects long waves; and quality-in-thing-ism creed is replete with arbitrary distinctions. Taking the leek by the wrong end (Eidolon Malgheridanum).

III. They *demonstrably originate in the subject*: Hemianopsia; is limitation of sensation only, peripheral neurone-tiers being in normal function; yet in presence of "qualitied body," patient experiences no quality. Whence, on sound side, quality *originates* from something not quality in lowest neuronetiers. Homology of other special-sense nerves with more primitive completely crossed condition of optics.

One of the queer notions come down the ages, is that besides their properties, bodies have other "attributes,"—*qualities*. In the nature and allocation of these, lies the key to the philosophic riddle. But, discussed from Plato to the modern text-book, solution is no nearer, the philosophers being today divided into the same opposed schools: Realists, asserting the "object" an extramental existent; Idealists maintaining that it is nothing but its qualities, which being purely mental, extramental substance is fetishistic myth. One school urges one set of considerations, the other, another set, both sets being of equal weight; meanwhile, many pertinent (nay, crucial) facts are not cited by either. Small wonder, then, that a wider survey of facts should result in a solution combining the advantages, while free from the one-sidedness of each.

Here, it is shown that: "Qualities" are mental states, but take origin from properties, which *are in* the object (of ordinary parlance); consciousness is two-factored resultant, changing the face of the epistemologic quandary; the mental-material boundary falls between qualities and properties, which rectification necessitates re-estimation of the shares contributed to knowledge, by mind and environment; experiences with an extramentally existent thing-series, account for three series of mental facts, otherwise contradictory and inexplicable: The concurrence with individualized percepts, of "primary qualities" common to diverse percepts; objectivation of the percept-series; and space as a purely mental (but empirical) elaboration.

Disposing first of "secondary" qualities, are they in subject or object; what does "object," mean? Defining preliminarily, not extramental realities themselves, but the infant's experiences with them:

Thing (-in-itself) or *Body*.—That which (1) offers constant passive resistance to the infant's movements (is *for its efforts, impenetrable*[2]); and (2) is *inexperienceable* but not unknown,—inexperienceable *as thing*, its experienceable (mental) counterpart being the percept-constant (*a*, of next paragraph).

Object.—Mental construct, out of experiences with *tangible*-visible (less with those appreciable by hearing, smell, taste),—construct embodying ingredients expressive of (*a*) motor-sensory contact experiences; (*b*) sensory fore-warning signs; (*c*) ad-personal relations.

The all-fundamentality of this distinction, lies in its coincidence with the line between properties and qualities, marking the rectified boundary between matter and mind. Meanwhile, immediately pertinent: If "object" mean the second, "qualities are *in the object,*" is (as other way of saying: In the subject and by him objectivated) mere platitude; but if the first, then:

Thesis.—Redundancy of synonymy exists: If "secondary qualities" are *in the subject*, they are synonym for sensations; if *in the thing*, for properties.

As fact, they are wholly in the subject; and things have but one class of fundamental attributes, *properties*.

Hypothesis.—"Secondary qualities" are *in the body;* that is, the "Something" *in it* that gives rise to color *in me*, is a "quality," is colored *in se*, is Colored-ness.

Hypothesis.—"Secondary qualities" are ***not in the thing, but in the sentient subject.***

[2] "Impenetrability" throughout this paper, *has no reference to the general question of "the impenetrability of matter;"* it refers solely to the *organism's inability to push through.*

I. PROOF OF PRESENCE IN THINGS IMPOSSIBLE.

In science, the first could be validated by proof that it is matter of either direct observation or legitimate hypothesis; but it is matter of neither.

Quality-in-thing-ism not directly demonstrable.—A "red body" is not directly visible by me, but visible through ether-waves reflected from it.

Subhypothesis.—Qualities asserted to inhere *in the body,* inhere equally in the refluents from it,—that is: The "white-ness" contained *qua* white-ness, in the "white body," is likewise contained *qua* white-ness, in the waves coming from it.

Here, experiment is decisive, and negative. It being of the essence of "qualities," that they are sense-appreciable, if "whiteness" be *in the waves, it will be visible* in them. But waves traversing dust-free air, do not contain anything visible,—but are invisible, when viewed laterally. "O, but, you don't see the waves at all; they are too small." They are no smaller than the molecules of N_2 O_2, "whose red-ness I see well, though not seeing the molecules; and they are no larger when in their line of prolongation, they induce red sensation *in me.* Besides, the waves cannot contain a single entity, "white-ness," since the prism breaks white-ness up into red,- yellow,- and every other *-ness*,—a fact easily explicable on established physical theory, that "the waves" are a fasciculus of different waves, which are sorted out by the prism, each wave subsequently and separately arousing *in me,* its "appropriate" color-sensation. Thus color-sensations ("qualities") are *not in the waves.*

But color demonstratedly not in the waves, *immediately all possibility of affirmative evidence for the first hypothesis,* vanishes! For, if waves not themselves colored, can nevertheless give rise to color in me, I cannot know anything as to color-conditions on the *jenseits* of the waves ("in the body"),—conclusion inevitable unless the second alternative be established:

Criterion: The only possible test of existence of red-ness *anywhere* (in subject or thing), is that I experience red,—and, in general, that *some subject* experiences it.

Criterion: Some test of existence of red-ness *other than* the foregoing, is possible,—*and if so, what?*

Can anything be said for the second? If I wanted to establish it, I should not know what to say. Certainly the test cannot be length of wave; for the only way red-ness and certain wave-lengths are known to correspond, is some subject's experiencing red upon impingement of those waves. Whence, quality-in-thing-ism is self-stultifying in that *any definition of "quality" involves appeal to the experience of the subject,* as criterion of the existence and identification of the quality.

Equally, voice-sounds are *not in the air-pulses,* for then they would be audible only as far as these pulses could carry them; whereas, I have recognized the "voice of a friend" 200 miles away, but only with telephone at ear.

"Quality"-in-thing-ism not legitimate hypothesis—Contention that it is, requires proof of non-conflict with facts and established generalizations; but this is in conflict with facts.

II. PROOFS "QUALITIES" ARE NOT IN THINGS.

1. *Were* the "secondary quality" *in the body,* distribution of qualities among bodies, would exemplify a relation between *qualities* and constitution, paralleling that actually existing between *properties* and constitution; whereas, distribution of qualities, is a purely incidental affair, the groups into which qualities fall (visual, auditory, etc.), having reference not to any classificatory scheme *for things,* but solely to the sense-organs of the subject.

Similar qualities with *dissimilar* composition.—Red-ness occurs, with potassium bichromate, mercuric oxide, eosin; blueness with copper sulphate, ferric ferrocyanide, "iodide of starch,"—etc.[3]

Dissimilar qualities with *similar* composition.—Black-ness and red-ness occur with iron oxides; white-ness, blue-ness, green-ness, with sulphates,—etc. Moreover, small changes in composition, often involve large changes in quality, mere hydration altering markedly the color of many salts (copper sulphate). Whence, quality sustains no *fundamental* relation to composition; it is, in fact, to a "physical" feature common to widely different bodies, that color corresponds.

2. *Were* the "secondary quality" *in the body,* qualities of compounds would bear a relation to qualities of constituents; whereas, though properties of compounds are a function of those of constituents (and of energy-extrusion in formative critical sequence), all facts oppose an evolution of qualities.

No *quantitative* relation exists.—The just noticeable differences in the white-black series, number about 35,000, and it is psychologic doctrine that each represents a different "quality." If, now, these 35,000 qualities are *in the body,* then either:

Qualities of compounds trace back to qualities of constituents *ad indefinitum,*—no new qualities emerge in connection with formation of compounds.

Qualities of compounds do not trace back to qualities of constituents, *ad indefinitum,*—new qualities do arise in connection with formation of compounds.

The first is not fact, since each of the 80 chemical "elements" would then exhibit some 450 white-black qualities, which no element does. Moreover, as fact, qualities of compounds do not trace back to qualities of constituents, for:

No *qualitative* relation exists.—Red, yellow, and black mercury oxides, originate from silvery Hg, and colorless O; blue copper sulphate, from red Cu, yellow S, and O,—etc.

But, not being derived from qualities of constituents, qualities of compounds come into existence in connection with the changes whose outcome is the compound,—in which case:

3. *Were* the "secondary quality" *in the body,* it would be syonym for this or that *property.*

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[3]Throughout, space admits of citation of illustrative cases only; but any one conversant with a wide range of facts, can easily supply instances for himself. Thus, in this particular connection: "No common chemical character has as yet been ascribed to the sapid substances which arouse sweet sensations. * * * Bitter sensations are aroused by very different chemical substances." (L. F. Barker, Osler's *Modern Medicine,* 1910, VII, 21.)

For, the factors involved in those changes, are: Properties of constituents, energy-changes in formative sequence. From neither of these separately, now, could the quality be derived. But appeal to their totality, is to make quality exact synonym for *property* (of resulting compound). Whence, a quality of a compound, is not a resultant effect of constituents, but an effect *de novo* in their resultant,—effect of compound *qua* compound.

Corollary 1: Neither concomitant nor successive sensations, have any interconnection or interrelation, whatsoever.—I drop yellow potassium ferrocyanide solution into red ferric chloride solution, blue ferric ferrocyanide resulting. Each color-*sensation,* now, arises independently, as a *separate upthrust* from the nervous rhizome, intermittently, because the rhizome is stimulated intermittently, by the respective lucigenous waves, which take their origin and their stamp from the selectively absorbing *substances.* And the *change* from yellow and red *in me*, to blue *in me* comes about not because the antecedent yellow and red *sensations* have any share in inducing emergence of the subsequent blue *sensation,* but because change comes about in the *substances* which separately made for yellow and red, to a third *substance* which separately makes for blue. Whence, the relation of the yellow sensation to the red, and of both sensations to the blue, is the *no*-relation of independent concurrents confirming the conclusions of Chapter V (18, 19) by an independent line of considerations. But antecedent yellow and red having no relation to subsequent blue, means, alternatively stated:

Corollary 2: The mental is no operation-cycle.—Amplified later, in refutation of subjective idealisms.

Corollary 3: "Continuous" sensation is pseudo-continuous merely.—Since the yellow and red *do not pass over into* the blue, here *apparent* continuity is *actual* discontinuity.

Corollary 4: No "novelty" is demonstrable in the sense-realm.—"Quality" being effect of compound *qua* compound (function of its properties), no assertion of a novelty can be based upon emergence of a *quality*-congeries not previously experienced; every such assertion must be based upon whatever novelty can be shown in the *propertied* congeries of which the *qualitied* is a function. But assertion that "potency" of *properties* was not in the antecedents, is assertion that in the particular transformation, there resulted an amount of energy not accounted for by the factors entering into the transformation,—that is:

Canon of exegesis.—Occurrence of a "novelty," cannot be substantiated by novelty *of characters* (qualities or properties); *such* novelty is a feature of the result of *every* transformation, equally. The only way such occurrence can be substantiated, is by evidence that in a transformation, an amount of matter or of energy results, out of proportion to the amounts entering into the transformation. And pending this successful impeachment of the conservation of matter or of energy, there is every warrant for holding that the Law of Unfailing Succession (continuity, causation) formulates *every* happening, mental, vital and inorganic, alike, down to the present status (time),—that it reaches back to molecules, atoms, electrons, ether.

So that, no amount of difference of any sensation ("quality") complex from its predecessors (which amount *has no measure!*), proves the newly appeared complex a "novelty." Thus, with Hyperthermophile

Philosopher, following down, through successive Critical Sequences, the cosmic energy-trend, the sensation-complex expressing his first experience with (water turning into) *ice,* would not be a novelty; but, then, no more would that expressing first experience with (steam turning into) *water,*—or that expressing first experience with (H_2 and O turning into) *steam* (etc). Subjective idealisms (in which sensations are *just sensations,* come from nothing) apart, sensations are sensations *of something.* But if every case of sensation of something that might conceivably be a novelty, turns out not to be, why was advent in phylogeny (first sensation *of something*) novelty? And the only intelligible harmonization is the philosophy of critical phenomena, which shows how *discontinuity of result is entirely compatible with continuity of process.*

4. *Were* the "secondary quality" *in the body* commonly accessible to all, it would *appear identical to all;* whereas, it *differs,* with different observers, and different conditions of the same observer.

"Quality" differing with different observers.—I showed a man worsteds which I saw as red and green. He recognized the worsteds as plainly as I, but could not tell green from red; therefore, he did not see both red-ness and green-ness. But since everything *in the worsteds* was as open to him as to me, yet either red-ness or green-ness was appreciated by me alone, the "quality" was *not in the worsteds,* but arose *in me* and not in him also, by reason of *capacity in me* which he lacked.

A tone-deaf man and I listen to a flute-player; I hear modulated tones, he a monotone only. But neither flute nor air-pulses from it, can contain at once modulated tones and monotone; therefore, they contain neither, and modulated tones arise *in me* and not in the tone-deaf also, in virtue of capacity, "normal" in me, "defective" in him.

And a parosmic and I smell the same rose; I experiencing rose-odor, he a stench. But *the rose* cannot have both rose-odor and stench-odor; therefore, it has neither, and the one arises in me and the other in the parosmic, by reason of "normal" olfactory capacity in me, which is "perverted" in him.

Therefore, at least the "secondary qualities" involved throughout the range of color-blindness, tone-deafness, and smell-perversion, are not in things, but wholly in the subject.

There is no such existent as "the object!" There are "objects,"—the blind man's object, the tone-deaf man's, the parosmic's, color-blind's, and "normal's." The last man complacently assumes his "object," the one, but psychophilosophically all have equal weight, the parosmic's with the normal's. All are equally incident to the conditions involved in sensation-genesis. For, all agreeing to the extent that sense-apparatus conditions in the respective observers, agree (visual "secondary qualities" of parosmic and tone-deaf, agreeing), and differing to the extent that those conditions differ (olfactory "secondary qualities" of parosmic and tone-deaf, differing), that genesis involves *two independently variable, interacting factors,* one common to all, one particular to each. And consensus of mental representation of environment, is incident of interaction with identical environmental moment, of organismal factors identical in "normal" co-specific organisms.

"Quality" differing under different conditions.—If "whiteness" is *in the "white body,"* how comes it that by change of conditions *in the ob-*

server (which has nothing to do with the body), "its" whiteness can be annihilated, and yellow-ness be *put into the body, all by the observer's swallowing* santonin,—or red-ness be put in, by his undergoing operation for cataract!

5. *Were* "qualities" *in the body*, difference of quality would involve difference of body, and sameness of quality, sameness of body; whereas, bodies differing *in qualities,* turn out to be growth-stages of one individual, while bodies exhibiting the same qualties, give rise to different end-results.

Difference of qualities in same individual.—Repeatedly, because differing in qualities, bodies have been described as different *genera,* but have proven only phases in the development of one individual. But if bodies can differ in qualities, yet remain the same individual, the qualities are *not in the body.* How it comes that qualities so different, appear in the same individual first becomes intelligible upon realization that each quality is *independently* and for itself, a function of a property coming into existence at that stage, and passing over into another property, in the stage at which quality disappears,—quality-progression incident of property-progression.

Sameness of qualities in different individuals.—Gray mouse and black mouse crossed, yield all-gray offspring, whose spermatozoa *inter se* and ovules *inter se,* differ not appreciably (not in "qualities," *i. e.*); yet the spermatozoon-ovule combinations yield 25 all-blacks and 25 all-grays, both breeding pure *ad indefinitum,* and 50 all-grays, yielding 25, 25, 50 (yielding 25, 25, 50, etc.). Whence, not only the spermatozoa and ovules but likewise the 75 all-grays indistinguishable *inter se,* prove very different, despite their agreement in qualities; and the same has been shown for some all-white mice, indistinguishable *inter se.*

And "hot" iron and "cold" iron are the same body; whence, hot-ness and cold-ness are *not in the body.*

6. "Quality"-in-thing-ism faces a fatal difficulty, easily harmonizable on quality-in-subject-ism.

Two independent, disparate facts exist, which quality-in-the-thing-ism cannot knit together: (1) A "red body" gives off (reflects) waves that are deflected by the prism (a fact entirely independent of the subject), to the "red region" of the spectrum; (2) my red-vision is massed in that region.

A body sends waves to the red region, *because it is red* (quality-in-thing-ism).

Any body is *called* red, that *sends waves to the red region* (quality-in-subject-ism).

But no condition *in the thing* can affect the distribution in the spectrum, of my color-vision. As fact, that distribution is regular, and in particular, my red-vision is massed at one end. But my red-vision being so massed, those bodies *are called* red by me, *that send waves to the region of my red-seeing* (reflect long waves with which my red-vision is, *de facto,* linked). That is: A body does not reflect long waves because it is red; it is "red" *because it reflects long waves,*—instance of commonest fallacy in psychophilosophy to-day: *Eidolon Malgheridanum,* from her of the *Decameron,* patron saintess of them that take the leek by the wrong end.

The same applies, *mutatis mutandis,* to auditory secondary qualities. Correlation *in me of* pitch with rate of succession of air-pulses, is explicable through reference to evolution not of the "sounding body," but of me.

7. The creed of "secondary qualities" is replete with gratuitous distinctions: It neither consistently includes in, nor consistently excludes from the category of qualities, *all* sensations, but ranks as qualities, *some* sensations, while not so ranking others, without deigning evidence to show in what the case for the one set, differs from that for the other set.

In what do the cases for hot-ness and cold-ness, differ from the case for color? But with cold-ness, the thing cannot contain and give off something *to the subject,* since energy-flow is from subject to thing.

Why is not pain-ness a "quality" *in the knife?* A paretic dement and I might be cut with the same knife, he with a smile, I with a cry. Whereupon (quality-in-thing "logic"), the pain is in the pain-making body; whereas, I should interpret: Difference in result, precludes allocation to that common to both, and forces relegation to that *particular to each.*

III. PROOFS "QUALITIES" ORIGINATE IN SUBJECT.

Though the second hypothesis is now established by exclusion, it can be proved by direct evidence, for visual "secondary qualities," at least. The visual conduction-path comprises four neurone-tiers:[4]

I. Bipolar cells of retina (optic nerve, proper).

II. Neurones from ganglion cells of retina, to thalamus: Those taking origin from *nasal half* of retina, passing via "optic nerve," *crossing in chiasm,* and *opposite* optic tract, to *opposite* thalamus; those from *temporal half,* via "optic nerve," and *same-side* optic tract, to *same-side* thalamus. So that, each optic tract contains neurones, and consequently transmits pulses from *nasal* half of *opposite,* and *temporal* half of *same-side* retina.

III. Neurones from thalamus to occipital cortex (optic radiation). Distribution of pulses, same as in optic tracts.

IV. Neurones of occipital cortex, especially region of calcarine fissure. Distribution of pulses, same as in tracts.

Destructive lesions anywhere above the chiasm, result in "hemianopsia," in which the patient sees the bodies in that *half* of the *visual field* of each eye, which corresponds to the lesion,—*left*-sided lesion (consequently, conduction to sensation-area, of nerve-pulses from only each *right retina-half,* consequently), "vision" of bodies in left half of each *visual field* (and, *mutatis mutandis for right*-sided lesion). Conversely, there is *no*-vision of bodies in *half* of visual field *opposite* to lesion,—*left*-sided lesion (consequently, *no*-conduction to sensation-area, of pulses from *left retina-halves,* consequently), *no*-vision of bodies in *right* half of visual fields (and, *mutatis mutandis,* for *right*-sided lesion).

Hemianopsia is, thus: Absence *of sensation* over half of each *visual field.* But equally the bodies in the *unseen* half, and those in the *seen* half of each visual field, are focused on the retinae. Unless, then, limitation *of nerve-function* parallels limitation *of sensation,* hemianopsia

[4]L. F. Barker, *The Nervous System,* New York, 1899, Chap. LIII.

includes: Non-coming *to sensation* of nerve-pulses from retina-*halves* tributary to seat of lesion; coming *to sensation* of pulses from *halves* tributary to sound side.

Limitation of retina-thalamus *neural activity* parallels limitation of *sensation.*

Limitation of retina-thalamus neural activity does not parallel limitation of sensation.

Here, neurologic evidence is decisive; no parallelism exists.

1. With occipital cortical or subcortical focal lesion (syphilis of cortex; cyst of lobe, cutting optic radiation), the first two neurone-tiers are intact post mortem (degeneration limited to third and fourth tiers).

This fact acquires added significance, from being no isolated one, but part of that host of accordant instances, which has given rise to the law: Degeneration is limited to the neurones injured.

2. In cases of *supra*-nuclear lesion (as in 1), normality of function is the correlate of anatomical normality post mortem.

Proved by innumerable cases, in man and animals. For motor neurones, it is established by uniform absence of "reaction of degeneration" and of muscular atrophy. And wherever conditions admit of direct test, it is proved for sensory and motor neurones alike, by actual demonstration of function. Thus, in all transverse lesions of the cord, the sensory and motor neurones forming part of the reflex apparatus below seat of lesion, function normally. And with cranial nerves, too, normal functioning of neurones below, is utilized as diagnostic criterion of supra-nuclear as against peripheral lesion.

When, then, with the first two visual neurone-tiers, direct test is impossible, because the only terminal whose activity *expresses* the activity of those tiers, is disabled, we have, nevertheless, every neurologic warrant for holding that those tiers are in normal function. And this conclusion is buttressed by facts:

(1) Where the peripheral tiers *are* demonstrably out of function, as in optic-nerve atrophy, the anatomical picture differs, *toto coelo*, from that in cortical-subcortical lesion.

(2) And similarly, the ophthalmoscopic picture, normal with uncomplicated cortical-subcortical lesion, is in nerve-atrophy, more or less profoundly altered.

(3) From the "blind" retina-half, light-reflex pulses are continually streaming up, as proved by pupil-contraction upon flashing light on to the "blind" retina-half (Wernicke's sign).[5]

(4) Where focal lesion has resulted in obliteration *of sensations, restoration of sensation* may, nevertheless, occur. Enlargement of the pituitary body, resulted in blindness "of (non-coming *to sensation,* of pulses from) the left eye," but following operative and X-ray treatment of the tumor, vision over a large part of the left visual field, progressively returned,—*proving* what? Clearly, that the first-tier neurones were in normal function, all the time; for, had they been degenerated, removal of pressure from the second-tier neurones, would not have resulted in restoration of function to the first-tier neurones,—and in vision.

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[5]This in itself, is perhaps not conclusive: it *may be* (though never definitely proved) that the light-reflex neurones are distinct from those transmitting pulses which ultimate as sensations.

In cortical subcortical (and other) focal lesions, then, the neurones below those implicated, are in normal function. But in presence of "qualitied bodies," the hemianopsia patient experiences no qualities. Therefore, on the sound side, his sensations ("qualities") *originate* higher up. Two consequences immediately follow:

Quality-in-thing-ism is false, since even waiving the above demonstration that qualities are not in the refluents from bodies, they here turn out not to be present *qua* qualities, in the lowest neurone-tiers of the subject.

Qualities *originate* in the subject, from *something not quality* in his lowest neurone-tiers.

But, then, the "something" *becomes* quality through *change.* Whence our theory only *precises* the facts, in saying: The "Something" is "nerve"-energy, which is itself not sensation, but gives rise thereto *through interaction with the other factor,* which is not present in the lower tiers, but present only higher up, where sensation does occur.

The whole argument may be epitomized thus: Since when visual nerve-pulses do come to *sensation,* they do so *hemianopsia-fashion* (and not as whole-eye vision), coming *to sensation, can occur only in hemianopsia-possible parts of the brain*[6], which are: Optic tracts to occipital cortex, both inclusive. But, demonstratedly the pulses do not come *to sensation* in the tracts; therefore, they do so in either the third or fourth neurone-tiers, every neurologic probability favoring the latter,—the view that *nerve-pulses come to sensation, where projection fibres abut on cortical mechanisms,* and the visual sensations are immanent in the occipital neurones.

Moreover, the voice-sounds are *not in the "sounding body"* (larynx), for the echoing rock has no larynx. But they are not in the air-pulses (above); therefore, by exclusion, they *originate* somewhere in the auditory apparatus.

Where do other nerve-pulses come *to sensation;* where "are" auditory (and other) "secondary qualities?" Here, it can be shown that the other special-sense nerves are homologous with a more primitive, completely crossed condition of the optics, and that therefore, in all probability, they too come *to sensation,* where the projection fibres abut on cortical mechanisms. But the proof being rather technical, it is relegated to another paper.[7]

"Secondary quality" is, thus, synonym for sensation, which is definable as:

Introspectively discriminable phase (nay, *factor*) *in a dynamic situation* (the psychoneural), constituting the pictorial (environment-representative) ingredient in "mind;" condition of arousal, critical (limen) value of relation between "nerve"-resistance, and "nerve"-energy *resulting from environmental stimulation;* seat, sensation-area, with (assumed) *elasticity* of whose substrate, can be brought into relation, the

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[6]The only alternative is: Or in some region to which the occipital cortex stands in constant, life-long diaschisis, but no such region is known; so pending the bringing forward of an actual case, this ultra-academic qualification remains a negligible quantity.

As regards localization, a sharp distinction should be made between this case, and cases (such as aphasias, where a vague psychologic complex is attempted to be correlated with an equally vague physiologic complex.

[7]*Origin of lens, decussation, and right-handedness,* New York, 1913.

facts that (*a*) sensations are *invariable throughout the whole life*[8]; (*b*) intensity is a function of intensity of stimulus, and (*c*) their office is introduction into the composition of forces, of components environment-representative by reason of intensities that are environmentally interproportioned (87); palaeogenetic (as old as sense-organs).

Exegesis.—That a common "Something" (source) results in different sensations in two individuals, proves[9] their sensations *two-factored* ("environment"-factored, individual-factored). The environmental component is a linked energy-chain: Vibration-rate (property) of thing, of unknowable color-condition; consequent ether-waves, not colored *in se;* consequent nerve-pulses, not colored *in se,* the last giving rise, upon interaction with the nerve-resistances of the sensation-area, to this and that color. So, when a blind man and I equally recognize an object, I alone appreciating color, this is not because color is *in the thing,* "though of course he can't see the color," but because while blind and I equally contain the organismal component, in me and not in him also, does conduction of the environmental component obtain, to the neurones in which interaction of components, results in emergence of something different from both, *sensation.* The same applies, *mutatis mutandis,* to all cases of conduction-defect, including the following: A syringomyeliac and I handle the same "hot body," he unaware of hot-ness or pain-ness, I of both. And a myelitic patient looked on, smilingly, while an ingrowing big-toe nail was torn off; he and I, then, might have had each a nail torn with the same pull of the pincers, he with a smile, I with a shriek.

Conclusions from Chapter VI.—"Secondary qualities" bearing no relations, in genesis, distribution (etc), to genesis, affinities (etc), of things, and being, moreover, demonstratedly absent from the refluents from things, and from the lowest peripheral neurone-tiers of the organism, have nothing to do with things-in-themselves, but *originate* in the subject, from something-not-qualities in his peripheral neurone-tiers. And here, at least, the matter-mind line falls on the *jenseits* of "qualities."

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[8]Other way of saying: Exempt from laws of lapse and fade (85, note 2).

[9]The only escape is solipsism, to say: I am the only existent, and the "other individual" and "common Something," are *but parts of me* (of my experience). For, if parosmic and I admittedly exist (*pluralistic* idealisms), given that he in connection with an experience of his which he identifies as "rose," experiences stench-odor, while I in connection with an experience of mine which I identify as "rose," experience rose-odor, the stench-odor and rose-odor experiences are two-factored,—a *common source,* and a *different individual* moment. And if the facts that (1) the "rose" which I see is the "rose" that I see *him* looking at and which he tells me he sees; (2) the "rose" that *I* am handling, is the "rose" that I see and feel *him* handling (when I pull, it tends to leave his hand; when he pulls, it tends to leave mine); and (3) the "rose" which I sniff at and experience rose-odor from, is the "rose" which I see him sniff at and he tells me he gets stench-odor from,—if these facts do not prove *same*-ness of source, it is because current notions as to "relations" (and in particular, sameness) are no clearer than those as to qualities and properties. And there is, at any rate, *either* common source for the *differing* sensations, *or* there is none to account for the *agreeing* sensations of the "normal." But if there is *any* common source, the *nature* of it, does not enter into the question,—if it be "Spirit," then the sensations are: Spirit-factored, individual-factored.

CHAPTER VII

SURFACE-SPACE CYCLE OF CONSTRUCTS.

("Primary Qualities").

Experiences accruing to motile organisms through contact with things: Impossibility of moving through, possibility of moving along, these together forming core of surface-construct, which is point of departure for spatial cycle.

I. Primary qualities are *undemonstrable in things,* being demonstrably absent from the refluents therefrom.

II. They are *demonstrably not in things,* since: Their distribution bears no relation to affinities of things, and magnitude of change in last, none to magnitude of resulting change in qualities; qualities of aggregates are functions of conditions of aggregation, and form-genesis is function of interplay of molecular forces; qualities of compounds bear no relation to those of constituents; difference of qualities does not involve difference of thing, or sameness of qualities, sameness of thing; and things have relation not to primary qualities, but to the mental irreducibles out of which those qualities are built up.

What "primary qualities" *are,*— fallacy; they are not irreducible content. "Extension:" Other name for surface; no criterion of matter. "Solidity:" Way of saying, Impenetrably surfaced. "Figure:" Way of saying how surfaces are conceived as disposed. "Size:" Way of stating amount of effort expended in encompassing thing.

Mathematical surface-space realism; its invalidity. "Real space," which geometry fits it, "curvature of real space;" their meaninglessness. Line, point, number, infinity, weight, mental constructs. Ex nihilo extramentali, nihil extramentale fit. "Truth" in representation of environment. "Space:" Construct expressing not region throughout which, but totality of instances in which spatial relation is supposed to hold. That relation formulates locomotor experiences in connection with surface; has naught to do with things, which are "related" each to its own past, separately (genetically). Genesis of space construct, by progressive linking on of new locomotor experiences, which are classified into distances and directions, the last systematized about rectangular axes. Extent to which space is learned: Different in different species; migration not necessarily proof of learned space-relations.

Moments underlying surface-construct: Moment underlying impenetrability feature, Dingtingness-Undintingness; moment underlying "continuity" feature, molecule-approximation.

III. Primary qualities *demonstrably originate in subject,* because reducible to his sensations, associated; recognition of qualities does not involve recognition of thing (astereognosis); and pain extension is purely mental.

But, the philosophers say, certain "primary" qualities, *are* in things, —extension, form, bulk, spatial qualities generally. With these, the ideas *in us* are, Locke says, mere copies of the qualities as they exist in external things. Were this copy-realism true, the philosophy of critical phenomena would be false, it conceiving sensation as generated between two factors, and different from either. But with this contention proved (above), existence of sensation guarantees existence of both sensation-generating factors, organismal *and environmental.* The latter (which is in the thing) is *properties:* but I experience it not *in forma* properties, but *in forma* the resulting "qualities" (sensations). That is: Experience is coextensive with consciousness ("mind"), and does not transcend it. But knowledge is wider, coming through reso-

lution of the mental diagonals into their parallelogram-side components, to take cognizance of the environmental factor as one represented not in, but only as antecedent factor of sense-experience, existent just on its *jenseits, but sine qua non* for it. Thus, knowledge comes to take account of the world of properties ("matter"); otherwise the sciences would be impossible, or possible only through introspective methods.

I. PROOF OF PRESENCE IN THINGS IMPOSSIBLE.

Were primary qualities present as such in things, the fact could not be known, for:

Hypothesis.—The primary qualities are present *as such,* in the refluents from the "qualitied thing."

If, now, this is fact, then either:

The extension, form (etc.), of the whole body, are present in the waves coming from each part of it,—or

The extension, form (etc.), of the whole body, are present only in the totality of the waves coming from it.

Here, experiment is decisive; they are in neither. With a glass cube illuminated behind an opaque screen with pinhole aperture, the waves issuing from the last, viewed laterally and in line of prolongation, exhibit no extension or form; whence, these qualities being sense-appreciable, they are *not in these* waves.

They are not in the total waves. For (1) most patients with lens removed, would not appreciate them, upon impingement of those waves; (2) though they are sense-appreciable, I cannot see them *in the waves* (they seem in the body, and not in anything between it and me); (3) with a body at one focus of a biconvex lens, I cannot see them in the waves, viewed laterally, obliquely, and in axis of lens,—only when in axis and at conjugate focus, I place sensitive surface, I create a situation, of which emergence of extension, form (etc.), may be a result (rather, result of result).

But inhering neither in waves from each part, nor in the totality of the waves, primary qualities are *not in the waves* at all. If, however, waves not qualitied *in se,* can give rise to those qualities *in me,* I cannot know anything as to the quality-conditions on the *jenseits* of the waves ("in the body").

Canon of exegesis.—*Quality*-conditions *in things,* are unknowable; the only knowable conditions *in things,* are *property*-conditions. The thing-in-itself is a congeries of properties ("thing" is name for[10] that congeries); the thing-as-experienced-by-us is a congeries of qualities and experienced relations; *its* name is "object."

[10]Which is definition from standpoint *of thing's effects,* including effects on us (our sensations, miscalled "*its* qualities"), from standpoint, *i.e.,* of our *experiences with* thing *qua* thing, as distinguished from our *knowledge of* it and especially its pre-thing antecedents. This kind of definition (definition *with distal reference,* in the cosmic genetic progress) is, by reason of the conditions involved in our knowing, necessarily *for us,* initial; but definition becomes scientific and fundamental, just in proportion to our growing ability to reformulate in terms *of origins* (to give definitions *with proximal reference,* in cosmic genetic progress). Thus, the "plain man" defines granite, as: Gray rock, suitable for building. But the chemist defines it: Mixture of such and such molecule-types, each composed of such and such atoms, arranged thus and so. And the physicist adds: The last composed of so many electrons (to which the future will doubtless add: Arranged thus and so); and Lodge (*Ether of Space*) says these are ether-forms. If this be *ex cathedra,* then, physico-chemical definitions are grounded in the ether, leaving it the *fundamental,* definable only in terms of its compounds and effects.

"But the contact-experiences themselves." Experiences with one molecule or many? "Many." A pin-point has many, yet does not yield the extension-experience; it must, then, be very many, enough in fact, to yield the experience of movement along.

II. PROOFS "PRIMARY QUALITIES" ARE NOT IN THINGS.

The same considerations that prove secondary qualities not in things, equally prove the primary not in them.

Distribution of primary qualities bears no fundamental relation to affinities of things, and magnitude of change in things, none to magnitude of resulting change in qualities; qualities of aggregates are an outcome of the conditions of aggregation; and form-*genesis* is an outcome of the interplay of molecular forces.

The on the whole rare cases of isomorphism throughout a chemical group, apart, diverse bodies exhibit the same (or closely similar) crystalline form,—incident of bodies being innumerable, forms few. And mere hydration may alter markedly form, as to crystalline. With aggregates, form is incident of conditions of aggregation (furniture, rock-forms outcome of pressures and rock-structure, cells polygonal from mutual compression). Lastly, form-genesis is outcome of molecular stresses,—crystals, of equi-tensions from a given center.

Primary qualities of compounds bear no relation to those of constituents.

Isomorphism again apart, form of compounds is irrespective of form of constituents; nay more, compounds with primary qualities, may originate from constituents without them (gases), and compounds without them, from constituents with them.

Difference of primary qualities does not involve difference of things, or sameness of qualities, sameness of things.

Difference in those qualities, does not prevent various embryologic, heterogenetic and metamorphotic stages from being mere developmental phases of one individual. And likeness of those qualities, among spermatozoa and among ovules, does not prevent the spermatozoon-ovule combinations from giving rise to different end-results.

Things have direct relation not to primary qualities, but to the mental irreducibles out of which those qualities are built up.

Which raises the question, What primary qualities *are*. Animals *move* in environment. Pushing along head foremost, the infant or other young animal soon encounters an "obstacle",—with what results? Postponing some pages, consideration of fundamentals, practically this result: With its head bobbing ineffectually against the obstacle, the infant finds movements of its limbs unimpeded. Moving thus as it can, its movements result in mapping out all possible transitions from less to greater resistance, which "all possible transitions," it later stenographs in "surface" (of obstacle). Any one can see infants at work going through this learning.

In contact with obstacles, the infant comes to associate its pressure (and other dermal) sensations, with possibility of *moving along,* but impossibility of *moving through* ("impossibility of" covering all degrees of difficulty upon), so that thenceforward, these serve as warn-

ing signs of such possibility and impossibility. Likewise, it comes to associate with these pressure-sensations, certain visual sensations (summing to "opacity"), which thenceforward serve as signs of what the dermal sensations would be were the infant in contact with the obstacle, and secondarily, as fore-warning signs of possibility of moving along, but impossibility of moving through. Here we have two alternatives:

The infant cannot move through *because the obstacle is impenetrably surfaced.*

"Impenetrably surfaced" is *way of expressing* infant's experienced inability to move through.

But the combination: Recognition of impossibility of moving through, recognition of possibility of moving along, is the basal ingredient in (quintessence of) the surface-construct. For, any consideration suggestive of permeability, negates, as mental incompatible (habitual non-associate), the conception of surface. Thus, passing the finger up one side and over rim of a mortar, to follow the surface, I do not carry finger across the "mouth" but regard surface as dipping down into mortar, to and across its bottom, up opposite inside, over rim and down outside. This is not because of disproportion between diameter of mouth and thickness of rim, but because of recognition that the mouth is for *passage through* (of drugs, pestle). For, though I say, "beveled surface of a hypodermic needle," in connection with the added sharpness thereby secured for the point, I do not say "surface of the mouth," though narrow, realizing that it is for passage through (of liquids),—but

WHAT ARE "PRIMARY QUALITIES?"

We answer: *Fallacy, not irreducible* mental content.

The word "extension," shall denote a Something, "Extension," to whose presence in "extended bodies," their extendedness is due.

The word "extension," shall denote the *mental state expressive of our experience with* "extended bodies."

The same word cannot cover both, they being different. For, the Something, "Extension," in extended bodies (*ex hypothese*), is either mentally appreciable or mentally inappreciable. If inappreciable, we cannot know It, and It is different from what we call "extension." If, however, the Something, "Extension," be appreciable, then, *our mental content representative of* It, is just what we mean by "extension." But, then, *our mental state,* "extension" cannot mean more than: Mental content corresponding *to whatever* in "the extended body," gave rise to that content, in us. There being demonstratedly, however, no Something, "Extension," in the refluents from such body, no way exists in which Neo-Realistic assertion that resulting mental state and "quality" in extended body are identical, can be proved; but it can be disproved.

Thesis.—The Something in "extended bodies," which gives rise to "extension" *in us, is not* a quality, "Extension;" it is a conjunction of physical moments.

But immediately pertinent: "Matter is that which has extension," is only left-handed way of saying: That which presents *surface.*

The *mental state* expressing my experiences with solids, is, however, different from that expressing experiences with liquids, and that different from the state expressing experiences with gases; since, then, "extension" cannot cover all three states, which shall it denote?

"Extension" shall denote the *sense-appreciable* extendedness experienced in connection with solids (and to less extent, liquids).

"Extension" shall denote *something different from* sense-appreciable extendedness,—as experienced with gases.

If the latter, what "different from" shall "extension" denote; and then the sense-appreciable extendedness of the table, is not "extension!" With solids, extension, form, bulk, are evident; so also is surface. But with liquids, form almost vanishes; and though bulk remains, it is largely by analogical extension from the case of solids, that we can speak of extension or surface. In presence of surface-tension conditioning the form characteristic for liquids (drop-form), the analogical extension is warranted. But with gaseous matter, extension and form vanish, incidentally to vanishing of surface. From what source would Hyperthermophile Philosopher floating free in an all-gaseous universe, learn aught about extension; he would first experience it upon emergence of liquid carbon (following advent of surface, *i. e.*).

Take extension which way one will, it is no criterion of matter, not being coextensive therewith (still less with substance). All this discrepant confusion clears when one realizes that extension is mere other name for surface, with which it *is* coextensive.

"But a light-wave has extension across its line of progress." Wrong use of "extension;" the wave vibrates a *certain distance* across that line. The only conception legitimately involving extension, is the conception of distance (travel-effort *along*), and all *measurements in environment,* are in terms of the *distance*-conception.

What, now, is "solidity?" Other way of saying: Impenetrably surfaced.

A body is impenetrably surfaced *because it is solid.*

A body is "solid," *because it is impenetrably surfaced.*

The second alone is mental construct; how can it be otherwise? Animals evince recognition of solids by not bumping into them. But what can *they* know about "inside;" *they* cannot section rocks, trees. And I recall the wonder with which an infant which had learned through many bumps, that "hard bodies" are solid, found a box which should have been solid, "hollow," and how it again and again lifted the lid to re-explore, calling attention to the marvel.

Regarded *because of uses for the subject* as a distinct class, "hollow" bodies form only a subgroup of solids, for: (1) The "hollow body" is no body (unity) at all, but an aggregate, the only bodies present being the solid bounding walls; and (2) every transition exists between solids with minimal cavity (too small to *put anything in*), and maximal cavity with thinnest walls, the latter "hollow" because of uses the subject will put it to.

Large animals (those having long lines of sight), chased, from a distance deflect their course so as to pass to one side of an obstacle; whence, equally with the human, they have come to associate with their construct of impenetrable surface, visual forewarning signs. But small animals (mice, bugs) run toward and then along obstacles, be-

cause in their experience, surface is often enough interrupted by crevices, converting "obstacles" into "shelter" (for them, the body is *not* impenetrably surfaced, hence not "solid").

The sensations serving as warning and fore-warning signs of impenetrability, are the ingredients that introduce into percepts, the suggestion of solidity, as a derivative from the intimated feature of impenetrably surfaced. Of visual fore-warning signs, most important are those summing to "opacity." When those are absent, the unit-conception of insuperable resistance to movement through and solidity, may not develop. A small bird flying in through a window open at bottom, to escape, flew up, striking the closed upper pane, with such force as to fall back dead; and three different pigeons, under the same circumstances, acted in the same manner. Hence, birds have come to consider unobstructed light synonymous with unobstructed "space;" have not learned transparent "surface" and "solidity."

What is "form" (figure)? Term describing way surfaces are conceived as disposed. If the crawling infant's environment consisted of only a wall and a floor, both of indefinite ("infinite") extent, it would come to know only two things (wall, floor), one "relation" (mutual rectangularity), and no figure. As fact, it finds every "surface" traced far enough along, cease to oppose resistance to forward progress, a fact it interprets as a "bending" *of the surface* (backward, round). Thus, its movements result in constructing this or that figure,—"square," where four sharp, equal bends of its body are required to keep in contact with the thing, during circumnavigation.

And "bulk" (size, volume) expresses the amount of effort expended in encompassing the thing.

"Weight."—Mental construct countering mass attraction, objectivated. From the supporting hand are experienced *sensations* (of pressure, "pull," etc),—and from the balance, visual sensations reminiscent-prophetic of what dermal sensations would be were body being supported. "Weight" is not a Something *in the body,* since all "a body has weight" means, is: The *earth "attracts"* it,—and the body equally attracing the earth, no more is the weight in the earth. Moreover, were "weight" a Something *in the body,* it would vary only with conditions *of the body;* whereas, it varies at different points on the earth's surface, and with difference in distance from the surface, up or down,—the body remaining unchanged!

SURFACE AND SPACE REALISM.

Mathematical surface.—W. K. Clifford propounded this puzzle:[11]

Things take up room; a table takes up *part of space* and makes a difference between the part where it is and that where it is not. Between the parts, is the "surface *of the table,*" something *just between* wood and air, *common to* but separating both, while being neither (no more thin strip of wood than of air), and itself taking up no room. Most important is that we here deal not with *ideas or imaginary conceptions,* but only make common-sense observations about matters of every-day experience, as that surface is *common to* a thing and the *surrounding space;* surface we constantly observe, *see, feel* (verbal condensation; italics ours). All which *means*:—

[11]*Common Sense of the Exact Sciences,* New York, 1905 (redated), 46.

Besides substance-energy, two other universe-magnitudes exist: *Surface, Space.* Surface is sense-appreciable, and *common to* (1) substances in contact; (2) a thing and the surrounding space. Surface is not mental construct.

Mentally, now, surface cannot be "common to" (be construct jointly embracing) wood and air; for while wood has, air has not sense-appreciable moments from which the surface construct can arise. If, then, "common to" have any meaning, it must be as denoting some physico-chemical wood-air combination; but none is known. Whence, Clifford's surface, just between substances in contact, common to both while being neither, is: Artistic phraseology!

But Clifford only voiced with his accustomed clearness, mathematical text-book talk of his day. So long, now, as mathematicians' surface represents only *convenient mode of view,* it is well enough; but posited as extramental reality, it becomes—myth. For, no one has ever experienced through his sense-organs, surface of zero thickness, or "continuous" surface, but at most only that which is not evidently discontinuous; and it cannot be proved a case where an extramental reality corresponds to a construct.

Line, point, infinity, mental constructs.—The surface-construct is the progenitor of line and point constructs; neither would arise in an all-gaseous universe. This from a letter of a thoughtful mathematical essayist, emphasizes current difficulties:

Mathematicians are "up against" the problem which seems to have defied the philosophers. They are worrying over a continuum or complete aggregation of points. We want to define consecutive points, but so far haven't been able to. The clock-hand moves from a point to another close to it; does not the hand cover all the intermediate points? I don't dare answer; I want to say "yes," but if there is a continuum of points, there must be an infinite number, and if such number can be covered in a definite time, *our notions of space and time must undergo radical change* (italics ours).

There are no points, outside the mind! The clock-hand is a pumice-like aggregation of molecules with ether-filled interstices; its "motion," a swishing through the ether; the clock-face, similar aggregate. Nowhere are there points; these are convenient ways of describing the motion. For, the clock-hand moves over 1, 2, 3 (etc.) cms. If, now, points *are extramental realities*, each centimeterful contains an infinity, and there are in all, 1, 2, 3 (etc.) infinities. And if, to escape, it be said there is in all, but one infinity, then, *with points such realities,* point-diameters are 1, 2, 3 (etc.) times zero,—multiples of infiinity or of zero, necessitating retreat into contention that point and infinity are mathematical constructs, of which (and the "logic" *whereof*) the mathematician is judge.

On neither quality-in-thing-ism nor quality-in-subject-ism, can line be extramental! Given a "red line" and a "green line," what quality has their point of intersection? On quality-in-thing-ism, it cannot be red and also green; and on quality-in-subject-ism, *if line is extramental reality*, there cannot emanate from the point, something that *makes for red and also makes for green* in me. Therefore, line is mental construct solely; and red line and green line are composite (super-) constructs. Such construct, I can, as empirical fact, make *ad libitum, provided* no

mental incompatibility is involved; but in making a point of intersection of differently qualitied lines, just such incompatibility is involved, and all I can imagine is:

A "continuous" red line cutting a green line (color of intersection, red); a "continuous" green line cutting a red line (color of intersection, green).

Draw a chalk-molecule mountan-chain, miscall it "line," and recite: A line contains an infinite number of points. *What* line; your *mental-construct* line, or the *mountain-chain?* The former contains as many points as you, by definition of line and point, make it contain; and it may be infinitely divisible, there being no incompatibility between the concepts of line and infinite divisibility. But the mountain-chain contains no points; and *it* is divisible at furthest, to the limit of the molecular discreta. So, if you transfer from your mental-construct line over to the molecular mountain-chain, the infinite divisibility of the former, you are guilty of one of the worst errors in philosophy:

Eidolon philosophicum.—Confounding of the object-construct with the thing-in-itself, with result of asserting of the latter, that which is true only of the former.

Is there, now, *in environment*, any actual case of infinity? Were there such, it would be one of the following:

"Infinite space" is much talked of; yet the astronomer measuring the distance apart of any two particular bodies, confidently expects that distance to be finite. It must, then, be "somewhere" between the stars, that "space" stretches away to infinity,—lame way of saying: Astronomical *distance* is infinite. But distance being a "one-dimensional" magnitude, its infinity is bound up with that of the number-series which measures it. Here, the vaunted infinity of our childhood, broke down, because there were not assumptions enough back of it. So, the mathematicians have got up a "new infinity," warranted logically consistent. Why not, seeing that avowedly in order to render deduction of this infinity possible, enough assumptions have been added, as that "0 is a number." Mentally, now, whether 0 is a number, depends solely on the definitions *given to the words.* But environmentally, 0 has no counterpart; it is nothing but mental symbol for non-existence (try maintaining weight on 0 meals). Whence, at least, the infinity got via "0 is a number," is nothing but mental figment (construct), and affords no evidence of any environmental infinity; if that exists, the fact must be separately proved. But no one has ever experienced through his sense-organs (experienced *from environment*), a case in which the "distance" apart of two bodies, was not lessened by their approximation; or one where taking units from a heap, did not leave the heap less by the units taken,—which cases, however, the mathematicians themselves, say do not involve infinity.

Physicists are continually approximating to molecule and even electron numbers, and bacteriologists to those of microorganisms,—*these* numbers are, then, not infinite.

"NUMBER" AS MENTAL CONSTRUCT.

But infinity is not matter *of environment, because number itself* is not! Practically all evidence showing "qualities" not in things, equally proves number not in them,—"number" not in refluents; single compound originating from multiple constituents, etc. And particularly:

Were "number" in things equally accessible to all, it would be appreciated alike by all, and not differ with different conditions of the same observer (temporary alcoholic diplopia), and with different observers. Thus, where most see "one," I see "two".[12]

I must cope ten separate times with bodies, *because they are* "ten."

I *call* bodies "ten," when and *because I must cope with them ten separate times.*

Now, I can "correct" the "false" impression, by: (1) Memory, that formerly the bodies appeared "one;" (2) drooping lid over iridectomy orifice, shutting off waves forming second image; (3) approaching near enough to make retinal images coincide; (4) handling body. The first three relate solely to correlation of reminiscent-prophetic fore-warning signs, with contact-experiences,—with the fourth class of data, which alone proves the body "one." But this is way of saying: I call that body "one," which I must *cope with singly*,—numbers are cope-with units, not thing-units.

Underlying number, there *is, in environment,* a condition-combination: Alternation of surfaced bodies with unsurfaced (or differently surfaced); number is incident of "surface" (it would not arise in an all-gaseous environment). Thus, a rock-ledge uniformly surfaced, is "one-ledge;" worn away in middle, it becomes "two pinnacles" (especially if water conceal joining ledge); these worn through at base and toppled over, are "two rocks." Which means not that number *qua* number is *in environment,* but that given such "discontinuity" combinations, each mind will find "number,"—consensus, incident of common environment.

The infinity-construct differs from the number-construct, in lacking underlying environmental moments. It is thus like the square root of—1, and unlike constructs such as "primary qualities" which arise on basis of such moments,—are *counter-real*[13] and not mere mental figments.

B. Russell[14] admits that pure mathematics and formal logic, consist of nothing but deductions from assumed premises ("indefinables" and "indemonstrables"); and that all mathematician or logician is entitled to assert, is: *If* premises be true, *then* conclusion is true. Nevertheless, having shown how via "0 is a number," the new infinity is got, he proceeds to apply it *to environment;* Zeno's puzzle is a shocking paradox for common-sense,—the *mental figment is tried on environment,* doesn't fit; why should it? The case is trivial, save as affording apt commentary on present-day methods in logic, mathematics and philosophy. Here, Achilles, tortoise, counter-surface, are real (extramental) existents; and Achilles gaining (to use "plain" language) on the tortoise, it is mere question of successive subtractions, until the latter's initial start is annihilated,—Achilles *has* overtaken him. "O but we can take the stages as small as we like." And so long as they are taken only *real*-ly small (remain such as could be realized in environment), so long the result remains only *real*-ly large, and continues to express the fact that Achilles overtakes. But take the stages *unreal*-ly small,—enter the juggle. Then the result becomes *unreal*-ly large, —Achilles overtakes "only in infinite time" (doesn't overtake).

[12]Monocular diplopia, due to irregular refraction by different lens-sectors, result of adhesion of iris to lens and consequent iridectomy.

[13]*Counter-real*: Denoting mental states *which have* environmental counterpart. *Counter*-surface (etc.): Denoting the *environmental counterpart of* the mental surface-construct. *To counter*: To correspond, term for term, mind with environment (and vice versa).

[14]*Principles of Mathematics,* Cambridge, 1903.

Proof? Russell's showing that the infinite series is not coterminous with (does not joint on to) the finite series (which has no top); you can't pass from the one series to the other! But the finite series of "natural" numbers is (1) a counter-real, and together with its fractional subdivisions (2) the only counter-real series (produce another which is not part of it). For, one can from a heap *of things, handle* out a thing for every member of that series, however far carried; but there's no zero thing. And at every successive stage, the term named, expresses both the order in which the corresponding thing was handed out, and the total number "of things," up to and including that thing,—which means only:

"Number" (of "units" aggregated as a "collection"): Aggregate *of operations* (handlings) necessary in order that a collection be distributed, member by member, until it is exhausted (until every "member" has been distributed).

"O but, numbers have *order.*" Put three homoeopathic pellets on tongue of child; it swallows them all together ("without order"). Put three pies too large for its mouth, before it,—"order" emerges.

Ordinal arrangement ("order," *pars*[15]): Mental construct expressive of form assumed by reaction-type ("successive" form), in face of conditions such that the organism cannot react to the situation collectively, but must do so distributively (must *select* a "first," and then a "next," *ad indefinitum*),—form assumed, for most part, in accord with least (locomotive) action, *nearest* being taken as "first."

I can see no problem in number,—except mathematical ones, which, however, concern *solely transformation of mental constructs.* "O but, by no logic can you, given the Many, get the One." Likely not, logic having (as I see it) nothing to do with the matter, which is mere incident of the general *how* of up-building, as incidental-necessary in evolution, of the human (equally, all other) mentality.

WHOLE, PART, SERIES, MENTAL CONSTRUCTS.

All facts, embryologic, physiologic, pathologic, prove mental content a function of substrate-conditions. And upon recurrence of environmental happening, mental content is repeated[16] in the same order as, and differs from the content experienced upon the first happening, not because the first content "caused" or modified the second (how could it), but because *reactively modifying substrate*, the second taking origin therefrom, emerges correspondingly modified. But, then, alike repetition and modification of content, presuppose modifiable (plastic) substrate. This, however, arose from *Anlage* in offspring, "is inherited" (92, 93), —what is inherited? *Structure,* immanent in which are (the quintessence of which consists in) the nerve-resistances, tempered via "natural selection," constituting the *organismal factor* of content. But identical environmental happenings result in initiating "nerve"-energy waves (*environmental factor* of content) identical with those initiated in parents. Whence, facing identical environmental situations, the offspring come

[15]"But there's order in our universe,"—soon it's gotten to be: "an *established* order," implying an Establisher and what not.

Orderliness ("order," *pars*): Mere way of stating fact that different minds observing the common universe under different aspects ("at different places") and at different evolution-stages ("times"), find themselves able to *correlate their results* (understand one another), which *means no more* than: Properties *are constant!*

(as result of interaction of identicals) to experience content identical with that experienced by parents, *despite the fact that no continuity of content between parents and offspring,* obtains. And from the happening, the offspring acquire modified content ("learn"), as did the parents.

Further, the identical motor organs existing in cospecific organisms, involving identical antecedent innervation-conditions, and these including identity of route and of content, there is identity of content among cospecific parents, and likewise among their (cospecific) offspring. Thus there grows up in discrete individuals, trend toward identity of mentality, ever accentuated by "selection" of organisms offering similar (optimum) response with similar organs,—there grow up *racial thought-habits,*[17] *notwithstanding that content develops independently in each individual.*

Among these are mental *sequences, paralleling environmental sequences;* and particularly those of the chained type: *a* (wait); *b* (wait); *c* (wait); *d* (wait); *e* (*act!*), which every animal is experiencing every day. Now, a cat watching an approaching bird, appreciates (I submit) this single "experience," only as an *unbroken reaction-preliminary,*—knows it neither as a "whole," nor as made up of "parts." But the animal become introspective (become human), comes to "analyze" its content as content, largely in way of attempts to precise the factors which made for failure or success (self-consciously to "profit by experience"). And then the experience becomes discriminated into stages ("parts"), to which the total experience constitutes an antithesis ("whole").

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[16]In the individual, content is repeated as a zigzag repetend, route (94) determining content, content reactively determining further route. For, those organisms alone survive which upon environmental happening, offer optimum motor response, which *includes* repetition of response upon recurrence of happening. But response occurs only sequent to corresponding innervation-conditions. Wherefore, in actually survived organisms upon recurrence of happening, repetition of innervation-conditions, obtains, which *includes* repetition of *route,* which partly involves, partly is involved in repetition of *content.* That is: Each thought exists not for its introspectively appreciable *quale,* but for its *specific dynamic-reactive, resistance-reducing* capacity. So that re-emergence of a particular thought, is followed by the same resistance-reduction that followed previous emergence, with result that "nerve"-energy is shunted into the same path it was previously shunted into. The consequence is: Emergence of the same thought that previously emerged, following the same shunting by the same thought,—emergence of *second,* "associated" (*neural*-associated) thought of train (etc.), not because the first "caused" (or sustained *any direct* relation to) the second, but because *reactively determining route,* that thought (and not some other) arises from the nerve-rhizome, as the first arose therefrom. The sequel is: Preferential discharge on to muscles, on to those previously innervated following that particular train,—*unless* following the permeable muscle-route, there is encountered, before the muscles are reached, another preter-permeable route (long-circuiting through association-tracts and correlative "thinking").

The memory-image is but simultaneous train of thought. Repeatedly, during gradual return of vision after iritis, I have observed persepts lengthened back into trains. What's that object on the mantel? Well, it's white; yes, and oval; yes, and concave,—never knew it. But often apparent concave has proved to be convex (paresis of accommodation); try, then, thinking of it as convex,—of course; it's that vase.

The memory-image exists not for its appreciable *quale,* but because that *quale* is the one corresponding to the particular resistance-reducing values which, all together, open the combination-lock guarding the muscles,—when *it* is present *mentally, they* are present *neurally,* and the resistances immanent in *every stage* of the particular route, are reduced ad minimum.

[17]Not *feeling*-"habits," which arise through selective excitation of brain by internally secreted (or resorbed) metabolic products,—as where the "adolescent psychosis" develops as a mental secondary sexual character, as one aspect of the general intoxication of the organism by products from maturing sex-glands, coordinate results being the anatomical secondary sexual characters, for some of which this mode of origin has been experimentally demonstrated.

..*Such mental "wholes,"* have, however, nothing in common with environmental unities (aggregates which have been unified via Critical Sequence—10), but are merely *mental ways of viewing mental content,*—the particular upshot of which is: Series are but mental constructs, and mathematical operations on them, nothing but transformation of mental constructs.

But then, why make a mystery of "number;" *that* begins to be *put in* when for ulterior purposes (as to get infiinity), the 0....*n* series is adroitly interchanged with the 1....*n* series, as though both were alike counter-real. Then the definition of number must be complicated and recomplicated, to accord with both series; number must be a property only of a class, the class of classes, and what not; is it, empirically, any such complicated affair?

In the 0....*n* series, we are not dealing with a counter-real series at all, but with a make-believe, mental figment, pseudo-number series. And since one cannot pass from it to the 1....*n* series and environment counters only with this series, when deductions from the 0....*n* series are tried on environment, naturally they turn out "a shocking paradox."

Canon of exegesis.—From non-counter-real premises, nothing but a non-counter-real conclusion, can be drawn; you can't hatch an *environmental something* from an *environmental nothing,* just by industriously incubating. That is: If premise is inapplicable to environment, the conclusion drawn solely from it, will prove inapplicable to environment.

It is neglect of this Conservation of the Counter-Real, which constitutes *Eidolon logicorum,* and makes of the "superfluous classical logic" (Ostwald), a thing apart, over and against the sciences. "O *but*, the universe is logical." The *Ultimate* Universe may be as it may; the penultimate is energic-gravitational only.

Value for mathematics, of the 0....*n* series, is not impugned, so long as results are not pushed beyond their radius of validity, and made to tell things about environment, which turn out "false."

"Truth" in representation of environment.—"A stone rolled down hill and into the brook," if "true," is so because every member of the mental representation-succession, stood in accordance with (because initiated by) the corresponding member of the environmental moment-succession; and each transition from (relation of) member to member in the mental succession, was *as regards its direction, in accord with the direction of the moment-succession (energy-trend),—down hill.* The mental series, in its entirety, thus comes to parallel the environmental, in its entirety; and the "truth" of the representation, lies in the *dependent accordance of mental with environmental* as final referendum. Thus, Herodotus says Neco sent mariners south to circumnavigate Africa, who, arriving, asserted that when sailing westward, the sun was on their right hand, which leads Herodotus to deny, but (supposing passage not later interpolation) me to affirm the "truth" of their account. But alike he in denying and I in affirming, find the "truth" of the assertion in its agreement with environmental conditions.

The definition excludes hallucinations; but includes, as equally on basis of environmental moment, vision of color-blind and "normal," environment itself no more resembling the one than the other,—*representation of* environment, relative to representing "mind."

MATHEMATICAL SPACE.

Since Bolyai and Lobatchewsky, mathematicians have been devising new geometries. Next, surfaces were invented, and fitted to each geometry,—whereupon surface-*curvature* loomed into importance. So long as the question remained one of *surface*-curvature, and how lines would behave if produced "to infinity" on this or that surface, it concerned only the mathematician, surface, line, point, being construct validifiable by convenience for technique. How the question of *space*-curvature came to be interchanged for that of surface-curvature, I don't know; but now one meets the query, Which geometry fits "*real* space." Here, all hinges on what "real" means; mental states are as "real" (if that mean only existent) *as mental states,* as are energy-vibrations or physical things.

In the phrase "real space," *real* denotes that the space is a mental existent only.

In the phrase "real space," *real* denotes that the space is an extramental existent *primarily,*—and a mental existent only secondarily.

If the first, space is mere mental-construct, and "curvature of real space," mean what it may,[18] mere further construct. But the second notion of space as matrix in which bodies exist, and to existence in which they owe preservation of their mutual "relations," parallels that misbegotten mongrel, quality-in-thing-ism.

"Space:" Totality of *instances in which* the spatial relation is supposed to hold.

"Space:" *Region throughout which* that relation holds.

The second, boxful-of-empty-space notion of the vulgar, receives no psychophilosophic support. The spatial relation *neither holds between nor has aught to do with things!* Two rocks on a hillside, have no relation to each other; each is an independent variable, and can roll down hill irrespective of the other, and is "related," if at all, solely to its own individual past. Its present status ("position") is the resultant of all moments that have entered into that past; it is "where" it is, not because the other is "where" it is, but because those moments resulted in hurling (moving, leaving) it "there." One qualification only: To the extent the rocks may have influenced dynamically each other's evolution (crashing together and rebounding), they have sustained a temporary "relation" to each other.

The relation I conceive as existing, has grown out of *my* necessities. With infinite knowledge, I should think of the rocks in terms of their respective evolutions (as I tend to think of animal phyla); but lacking such knowledge, yet having to live with the rocks, without bumping into them, there has grown up in me ('I have constructed") a motor chart, *my* space-construct, whereby I can orient my movements, so as to touch or avoid the rocks.

Learning to use the microscope, weeks elapsed before I came automatically to move the mechanical stage the "wrong" way, to bring a body into the field. "Of course; because relations are real (extramen-

[18] J. W. Withers (*Euclid's Parallel Postulate*, Chicago, 1908, 64, 136) says "curvature of space is constant," is only way of saying: Bodies are movable. But here (as elsewhere) he says of *space* that which is true only of *surface*. Indeed, the three competing geometries deal *not with "space", but with surfaces,*—solid geometry, even, being concerned with *bounding* surfaces only.

tal) existents." Why, then, did I, several years later, with the camera lucida (which re-reverses the image) on the microscape, find it just as difficult to learn to move the stage the "right" way? And in this case, just where were the "spatial relations"—in microscope, stage, slide or bodies thereon? Was not "spatial relations" *mere name for interadjustments of arm-movements and visual sensations,* and consequently, *mere mental* existent?

At the behest of physics, I admit substance-energy.[19] Asked, now, to accept another category, I inquire whether:

"Real space" is snyonym for the all-pervasive ("omnipresent") ether.

"Real space" is *something other than* the ether.

If the second, what "other than" is space? "Bodies occupy space," is meaningless unless space be defined intelligibly. But if the first, "space-curvature" can only mean that the ether is an onion, has curvilamellate structure (conchoidal cleavage). It cannot, however, have such structure in every direction through even the one part ("point") where I stand,—not to mention every direction through every part. Therefore, it has no such structure.

GENESIS OF SPACE CONSTRUCT.

The surface-construct is the point of departure for the spatial cycle of constructs. In course of the infant's years-long experience, two situations are continually recurring. Crawling to right (clock-wise) in contact with a surfaced thing, the infant has, all the while, the thing on (1) its right, or (2) its left side. In the first case, it learns that it is free from the thing; in the second, that it is encompassed thereby, and can "get out" only through some breach in the latter's impenetrable surface (hole, door, window). Constant repetiton of latter situation, results in the infant's mapping out its relations to surfaces and breaches,—to room, door, hallway, front door, "outside," the last with four bounding surfaces (courtyard), or two bounding surface-series (street). Involvement of these relations equally in every locomotor experience, accounts for the universality and all-insistence of the space-relation gamut.

The infant thus merely links on, progressively, to its first limited crawl-experiences, result after result of added locomotor experience. That thus I learned, I cannot doubt. Though not remembering the earliest stages, when aged four, I went unattended all over Washington City, I was never at a loss as to how I must turn to get to the starting-place (home), having marked my going course, by number and magnitude of turns. And all subsequent experiences have been added in the same way, by linking to some determinate starting-point (railroad station, *e. g.*), of motor-experience relations, meander-survey fashion.

The infant thus learns, concurrently, *distance and direction,* the two space-radices, so to speak; and, as synthesis of them, *space.*

Early experiences being predominantly surface ones, the infant starts life as a two-dimensionalist,—about 6, though I believed, on state-

[19]Substance includes besides matter (substance in atomic state), at least also, electrons and ether. *Matter* and energy being independent variables, are separate existents. Thus, energy occurs dissociated from *matter*, in interstellar transits. And between successive critical sequences, each material unity (molecule) varies in its energy-content (water so varying between 100 and 0°C), all the while retaining its distinctive properties, in virtue of which I consider it the "same" thing.

ments, the moon very far away, it seemed that were my arm only a little longer, I could grasp it, rising over a near-by fence. The vertical dimension is gradually added, likewise by linking locomotor experiences (climbing ladders, hills), and largely through "social inheritance" (astronomical pronouncements).

To what extent is space learned.—The foregoing assumes space-relations learned; are they? In the human, certainly. In wide-ranging domestic mammalia, too, there is little doubt that acquisitions come about in the same way, by linking on to the already experienced, of further experiences in connection with locomotion over new territory. But for the animal kingdom at large, whether and the extent to which relations orientative of the organism in its environment, are learned, depends upon the species. Thus, the present anadromous habit is no evidence that anadromes have added aught to their psychology, since the geologically remote period when they began migration to the beach of the rising continent.[20] For, there now exists instead of the original to-beach migration, that habit, because *environmental conditions were such that further concatenation of environmental stimuli,* came about,—more prolonged stimulation (of same type), consequent more prolonged response and longer journeys, but all involving the same simple reaction-type (response, in intoxicated condition, to cooling-water or to warming-water stimulation, according to species). And what holds for fishes, has extensive, probably all-extensive application throughout the animal kingdom.

Fishes, then, *know* nothing about migration; they are organisms in which activity of certain motor paths, comes to supplant that of other such paths, when internal secretion from ripening sex-organs, results in (1) reduction ad minimum of resistances along, and (2) liberation ad maximum of energy into those paths, resulting in reaction to environmental stimuli "neglected" under other (sexually unripe) conditions. The activity is, thus, intoxication-motivated, not learned; for in salmon species in which the parents all die up-stream before hatching, the offspring when sexually mature, perform their first (and only) migration as well as did the parents. "The salmon migrates because it inherits a *Migratory Instinct,*" is, then, mere metaphysical argot for the empirical fact that there develops in the young, as in the parent (the young "**inherit**"), testicles (or ovaries),—developed later as Theory of Instincts, as intoxication-motivated activities, definitely recurrent in life-cycle, in dependent relation with definitely recurrent activity of intoxicant organs.

All which exemplifies the wide difference between the mentality associated with the orientative activity of inhabitants of a surfaceless world, and the corresponding mentality arising in connection with contact-experiences with a "surfaced" environment.

MOMENTS UNDERLYING "PRIMARY QUALITIES."

For there is nothing in "mind," that was not given, directly or indirectly in (nothing not gotten from) environment conditions. No more than physical things, do mental states come from nothing. Underlying each "secondary quality," is a property; but primary qualities *as such,* lack underlying moments. Moreover, secondary qualities are *in posse* in the refluents from each part of the thing, equally; whereas,

[20] My *Habits of Fishes* (*Amer. Journ. Psychol.,* 1902, XIII, 408-25); and 1909, XX, 81, 82, 103-4, for complementary explanation that the motor underlying anadromy, is intoxication by internal secretion from ripening sex-organs).

the primary are only remoter results of the totality of the refluents. This (the real difference between the two classes) is only another way of saying: Secondary qualities are content already in simplest terms, and as such, resolvable into two pre-conscious, psychogenic factors, one of them an energy-chain taking origin from, and therefore having a facies constantly representative for a property; while primary qualities are reducible content,—reducible to surface, to impenetrability, to dermal sensations associated, the last being the mental irreducibles. What, now, are the environmental moments underlying the experiences Can't move through, can move along? Recurring to postponed fundamentals, the infant encounters an "obstacle",—with what result? That language (philosophic no less than popular) lacks terms discriminative of what occurs *in the infant,* from what occurs *in the thing.*

Here, preferring unusual terms, as freer from connotations and double signification (*subject's* experiencing "hardness" upon contact with "hard *bodies*"), Dintingness may denote that condition of *bodies,*[21] in which they undergo local deformation under impact of moments; antonym, *Undintingness.* Then, the surface-construct is referable back to: (1) A Dintingness-Undintingness moment; (2) a molecule-approximation moment. To what physical ultimates, do these proximates trace back? Both alike to the residual energy-content.

Small energy-extrusion; correlative large residual content and small densification; consequent liquid state, or solid state near solidification-point; consequent *Dintingness* (all grades).

Large energy-extrusion; correlative small residual content and large densification; consequent solid state remote from solidification-point; consequent *Undintingness.*

"Softness" and "hardness".—L. J. Walker[22] says these are "qualities," *in things.* They are constructs, expressing three classes of experiences (each an independent variable): (1) Degree of muscular effort; (2) resulting pressure-temperature-pain sensations (each an independent variable); (3) sensations apprising of *amount of effect wrought on thing.*

Softness.—Expressive of experience-combination: *Disproportionately great effect on thing,* upon minimum-moderate effort, with low intensities of resulting dermal sensations (pressure-temperature). Corresponding condition *in thing,* Dintingness.

Hardness.—Expressive of experience-combination: *No* (appreciable) *effect on thing* despite maximum effort, with maximum intensities of resulting dermal sensations (pain also?). Corresponding condition *in thing,* Undintingness.

Thus, *in a box* on wheels, is (the condition of) Undintingness. *In an infant* pushing against it, are (arise): Feeling (of push-effort) and sensations (pressure, etc.). Result *in box* (of infant's push): Molecular stress. Result *in infant* (of result on box): Appreciation of powerlessness to affect box (sense-appreciably),—interpreted as: "Box is hard," which merely means, doesn't dint. With maximum effort, result *in infant:* Intenser feeling and sensations. Result *in box* (of

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[21] A "condition" of a body, is a function of its residual energy-content. "State," while synonymous with condition, should be specialized for the etheric, electronic, atomic-molecular, gaseous, liquid, and solid conditions.

[22] *Theories of Knowledge,* London, 1910, 46-9.

stronger push): Stress coming to surpass friction ("inertia"), with ensuing "motion." Result *in infant* (of result on box): Sudden change in sensation-complex (diminution in intensity of contact-sensations, on recession of box); appreciation of power to accomplish.

Again, *in butter, is* Dintingness. Result *in infant* poking finger into it: Feeling; sensations (of temperature and "stickiness"-complex dominant), from widening finger-area; appreciation of effect wrought on thing,—"butter is soft" (*i. e.*, dints under pressure).

With successive critical energy-extrusions, molecule-approximation increases to the point obtaining in solids, in which it is of two grades: (1) A grade where the only interruptions are the intermolecular lacunae; (2) one where between two portions of the thing, in each of which interruptions are of only the preceding grade, a larger gap exists, by whatever name described (crack, perforation). So long as interruptions *in the thing,* even if of the latter grade, are sense-inappreciable (microscopic breaks in histologic surface), so long in the representative mental series, no corresponding interruptions arise, and the state is that of "continuity" (which is the negative term, meaning: Absence of —appreciable—"discontinuity"). But when the gap *in the thing* is large relative to the examining part (finger), there ensues *in the resulting mental series, interruption,* "discontinuity," consisting in alternation of a "continuous" surface state with a different state, with return to the "continuous"-surface state—giving rise to conception of "broken" surface.

Astronomical "space".—One vast mental construction! We see—lights. Accessible luminous bodies are hot; therefore, the sources of light, are. The sun's face is crossed by Venus. With accessibles, the body so crossed, is remoter; therefore, the sun is. A light is now in one line of sight, now in another. With accessibles, such variability means "motion;" therefore, the light-sources are moving. A light shifts from one sight-line to another, in a given time, but in another part of its course, takes longer in crossing an equal angle,—therefore, the second time, it is moving less rapidly or more obliquely, just enough less rapidly or more obliquely to make the figures accord all round. So we juggle figures for mass, distance (etc.), till they fit.

Validity of methodology and results is not impugned; they are, however, only mental construction (*inferences from* observation); and (immediately pertinent) nothing herein warrants assertion that astronomical space is *region throughout which* the spatial relation holds; clearly that space is mere totality of instances of which that relation has been made to hold. And any warrant for asserting it region throughout which, must come from warrant for holding accessible "space" such region. But as seen, no such warrant exists.

"But the walls of your room would bear the same relation to each other, if you were gone." Wrong use of "relation." Each wall is "related" solely to its individual past; and is "where" it is not because the others are "where" they are, but because it was built on its own base, rigid enough to stand thereon,—and the other walls likewise. "But they are at a certain distance apart?" Wrong usage of "distance."

"Distance" as mental construct.—My saying "ten feet apart," represents *my relations to the walls.* not theirs to each other. True, every mind measuring (a mental affair) with my foot-rule, will equally say "ten feet," which, however, proves not that distance *qua* distance is

in environment, but only that there *are* in environment, certain sense-appreciable constants (matter-conditions, of rigidity type), which given, each mind will find "ten feet," as I found it,—consensus, incident of common environment.

"Distance" is construct expressive of amount of travel-effort expended, on the average, in reaching a body. The conception has become barnacled over with conventionalized *measurements of* distance ("distance is two miles"), often confused with distance itself; but early units preserve the source of the conception (pace, day's travel).

To what environmental moment, does distance trace back? To none, directly; it expresses *possibility of movement (of something),* distance between two bodies, expressing maximum possibility of interpolation of rigid standard, which is, however, mere substitute for (ascertained equivalent of) a certain amount of travel-effort.

"Direction" as mental construct.—Direction is construct expressive, primarily, of amount of reorientation of subject necessary that he may travel with equal-sided tensions ("straight") toward a body. But locomotor activities coming to cover not only going from starting-point to one body, but also going from that to another, and from that to a third, and then return to start, all locomotorily accessible bodies come to be regarded as interconnected by lines representative of actual or possible travel. And all these come, in connection with growing needs (of commerce, above all of computation) to be oriented with reference to some central point (capital, pole-star).

III. PROOFS "PRIMARY QUALITIES" ORIGINATE IN SUBJECT.

Because (1) they are reducible to his sensations, associated; and (2) were they in the thing, they would be recognizable *incidentally to recognition of it* (if qualities were recognizable, thing would be, *a forteriori*), whereas the astereognosis patient recognizes the primary qualities separately, yet is unable to recognize the object, which is intelligible only through realization that these "qualities" are *half-way syntheses toward* the object-construct.

Further, that "extension" originates mentally, in absence of experience with any "extended body," is proved by the case of pain extension, where mental extensity may arise solely from neural intensity, as in pains of central origin (neuralgias, almost certainly intoxicant-induced), and by the following: Feb. 16, 1910, my gall-bladder perforated (found perforated, surrounded by abscesses, Feb. 21). Immediately, I experienced the well-known violent pain of liver-disease, radiating to right shoulder (acromion), lasting 20 minutes (till subdued by morphine). At the focus (pus-bathed peritoneal surfaces), the pain was continual, but fluctuated in intensity ("throbbed"), violent throbs being accompanied by hot-scimitar-like thrusts through lung to acromion, with persistent violent intensities, the liver-acromion pain persisting as a shallow bow, concave ventrally. But with less intensities the scimitar was of intermediate length, with its point in the lung, and shortened with decrease and lengthened with increase in intensity of the focal throbs, extending to acromion again, with each violent one. Here clearly, mental extension corresponded to naught save neural intensity. And the case offers insuperable difficulties for inch-to-inch localization, there being no nerve tract having the distribution of the mental pain-bow.

Conclusions from Chapter VII.—For the same reasons "secondary" qualities are not in things," primary" qualities are not in them,—absence of these qualities from refluents and peripheral neurone-tiers, non-correspondence between qualities and nature of bodies, and direct evidence of genesis in subject. And here also, the mind-matter line falls on the *jenseits* of "qualities" and the *diesseits* of properties. The surface-extension and space conceptions are purely mental (but empirical) elaborations, expressive of experiences with certain aspects of things-in-themselves.

CHAPTER VIII

PRIMARY-QUALITY AND OBJECT SYNTHESIS.

Temperature-zone we inhabit, cross-sections cosmic evolution; result, all bodies in one of three states: State offering to passage through, inappreciable resistance (gaseous); appreciable resistance (liquid); insuperable resistance (solid). Though mere "physical" conditions common to diverse bodies, so important from standpoint of *reaction* to bodies, are their states, that sense-organs have become adapted to apprise not of constitution but of state.

While *ultimately* sense-experiences are sensations, these occur synthesized (associated) to *proximates, representing sensation-factor* combinations oftenest recurring in environment. In perception, dermal sensations fundamental, as representing contact-experiences, constant for all observation-conditions. Those experiences varying dependently with nature of body, synthesized to proximates representing secondary-quality differentia. Those sensations varying dependently with effort, synthesized to proximates, representing, partly primary-quality differentia, partly primary qualities common to all bodies in same state. Solids dominating human environment, last proximate is impenetrability experience (*alias* surface-"extension," *alias* primary qualities generally).

Foregoing proximates super-synthesized to percept-constant: Experiences with each body common for all observation-conditions. Super-supersynthesized with this, to object-construct (percept), are: Sensory fore-warning signs, reminiscent-prophetic of contact-experiences, or else meaningless; and ad-personal relations, so important for man that he has his universe oriented-classified around them.

Surface-extension and primary qualities common to wide range of percepts, because common content expressive of common experiences with body after body in same state, came to be built into object-construct after object-construct.

No common observation-conditions existing, consciousness and energy cannot be proved different *on characters;* canon of exegesis.

Objectivation *presupposes existence of noumena, contact-experiences with* which arise *only sequent to travel-effort.* All mental states, arising only sequent thereto, are objectivated. With sensation two-factored, this is corrigible to: The *source of* sensation, is "external" (reachable only after travel-effort). Why pain is not objectivated.

Tridimensionality-construct; environmental moments underlying. Mind and cosmos alike *serial:* former not coequal with latter. What we do not know. How empirical facts get metaphysical twists. Science is progress from experiential to extra-experiential knowledge. Definitions.

The experiences of the crawling (walking, etc.) infant, extending over years, with things, are of three main types; and accordingly the content expressive of them, is of three types (I, II, III, below). For though ultimately that content goes back to the sense-data, these oc-

cur variously synthesized (associated) to proximates (sub-constructs), separately tributary to the object-construct.

1. The *percept-constant.*—Characteristic of this subconstruct, is that expressing contact-experiences, to the extent that these are a function solely of the specific residual energy-content of the thing (extent of the motor-sensory contact-experiences, below), the subconstruct is constant, within the temperature-range that the thing remains the thing it is.

The percept-constant is built up out of three sub-subconstructs (*a, b, c*), respectively expressive of three distinct phases of the contact-experience (*A, B, C*), namely, taking "table" as instance:

A. Experience of Can't move through (and, incidentally, Can move along),—experience becoming *two-aspected* ("subjective"-aspected, "objective"-aspected).

The resulting content concerns solely *mode of aggregation* (and is independent of nature of material), is of primary-quality type, constant while the thing remains itself, and *universal with diverse* bodies in the same (solid) state.

B. Experience of (1) four slender-cylindrically surfaced bodies ("legs"), of constant "size" and "distance apart;" (2) a plane-surfaced body ("top"), resting on the legs; and experiences that (3) the legs pass without obvious interruption into the top (*sensory* proof of singleness of aggregate); and (4) when any one of the five parts is "moved," the other four parts *move with it* (*motor-sensory* proof), wherefore, the infant comes to regard the table as *"one"* something, every part of which must be reckoned with not separately, *but in common with the remaining parts.*

The resulting content concerns solely *mode of aggregation* (and is independent of nature of material), is of primary-quality type, constant while the thing remains itself, and *differs with diverse* bodies in the same (solid) state.

C. Experience of a something, not painful, not markedly hot or cold, the sensations from ("qualities of") which are characteristic for a particular experience-unit ("wood").

The resulting content concerns solely *nature of material* (and is independent of mode of aggregation), is of secondary-quality type, but constant while the thing remains itself, and differs only with *difference of matter-species.*

The paramount importance for experience, of the dermal sense-organs, lies in their position over the muscles, a consequence of which is their functioning whenever muscular activity results in approximating body-surface to things,—whatever the physicist determine "contact" to mean.

a-b. Functioning between muscles and obstacle, gives rise to an experience with two aspects: An aspect in which the resulting sensory association-product is a function of degree of muscular activity; an aspect in which that product is a function of nature (sense-appreciable properties and conditions) of things.[23] Dependently with degree of muscular effort, vary the intensities of the (1) kinesthetic sensations corresponding to that effort, and (2) modifications of those sensations, rep-

[23]If one is disinclined to admit this double dependence (upon muscular effort, upon nature of thing), let him try maintaining the contrary thesis, that character of resulting association-product is *independent* of either.

resentative of *effect of the contact upon the subject* (strain sensations in connection with retarded or arrested progress); and (3) the pressure (to less extent, other dermal) sensations from body-surface in contact with thing. Whence, results an "association" between each intensity of the last sensations, and the corresponding intensities of the other concomitant sensations, each such association formulating a motor-sensory contact-experience,—"motor-sensory" emphasizing the role of activity in shaping the facies of the sensation-complex.

Being association-product representative of the *intraorganismal* conditions (arrested progress of the organism), during contact, the motor-sensory association-product expresses the subjective ("I"-can't-pass-through) aspect of the total contact-experience; and is an important tributary to (not to say crux in) Ego-synthesis (in later chapter-series). But since all content arising through experiences *with things,* is objectivated, so likewise is this association-product. And the statement, changed to the passive voice, runs: *The thing is* "impenetrable,"—*by "me,"* qualification understood, and therefore forgotten.

b. In keeping with differences in mode of aggregation of different things, the motor-sensory contact-experiences *differ with different* things. Thus, with one Something, the infant finds a free-crawl interval many times the diameter of the slender legs, and this aggregation-type it calls "table;" while with another Something, there is no interval, and this type it calls "box."

c. Dependently with the *nature of things* (the matter-species of which it is composed), vary the proportionate intensities with which the pressure, heat or cold, and pain sensation, enter, and also such circumstances as cessation upon, or persistence after withdrawal of body-surface from contact,—whence, the possible combinations among the independently variable sensations, resulting in such constructs as "stickiness" (hardness, greasiness, etc.), characteristic for this or that substance. Though this class of content is rather (or entirely) of secondary-quality type, it is constant for all observation-conditions, within the temperature-range that the body remains unchanged.

"Concepts."—The notion that a concept arises through our first becoming acquainted (how?) with objects containing a certain feature, and then "abstracting" from each, the feature common to all, whether myth or not, misses, at all events, the vital point, How came the object to contain the (likewise every other) feature? And of this supposed mode of origin, surface-"extension," figure (etc.), are, at any rate, not instances. They arise as sub-subconstructs, proximate syntheses, tributary to the object-construct.

c. For, while diversity of aggregation involves corresponding diversity of detail in the motor-sensory contact-experiences, this series is, nevertheless, uniform, and represents different degrees of difficulty upon (with liquids), up to impossibility of passage through (with solids),[24] —coupled with possibility of movemet along (the transition from less to greater resistance). Whence, it comes that to *diversity throughout a wide range of aggregates* (solids, liquids), there corresponds *uniformity* of contact-experience.

Proof? Just *solids, liquids, gases!* Whence these groupings? Not from environment, for: (1) Likeness and difference of states, bear no

relation to affinities of bodies, bodies of all varieties of constitution, being gaseous, liquid, solid; (2) complete change of state may involve no (demonstrable) change of constitution (melting of ice); (3) state of compounds bears no relation to state of constituents (calling gases, *g*, liquids *l*, solids *s*, almost any of compounds, *gg, gl, gs, ll, ls, ss, gls* may be gas, liquid, or solid), 4) no *group* boundary exists, one group undergoing increase by additions from, or decrease by loss to another group, of one or more members, with every 10 degrees, up or down, (5) the liquid state is a double incident ("accident") of temperature and pressure; (6) from the standpoint of cosmic evolution, all states are, *with all bodies alike, mere successive incidents* in the course of progressive energy-extrusion.

Whence, then, these groupings? Why, from the *uniformity of man's motor-sensory contact-experiences with the bodies corresponding to* the objects grouped. Thus, he says: Can't move through *this* body, and this (etc.), *i. e.* "impenetrable," *i. e.* "solid." Thence, he proceeds: But with all these bodies alike, I have had the common *experience* (can't move through); therefore, they (the *bodies themselves,* now!) are alike. Each is *a* solid; all together are solids (*class*),—considering similar cases reacted to similarly, not reacting similarly to cases considered similar.[25]

Which is classification not of *things, but of experiences with* things, classification of *object-constructs* representative of those experiences. All these objects contain a common feature, not because the feature pre-existed *in the thing,* but because in consequence of *common experiences with* thing after thing, there came to be built into construct after construct, common content expressive of that common experience. And the only difference between the *quality*-construct and the *object*-construct, is that the former is a *partial* synthesis, of content representing those experiences only that were common with all the bodies; whereas, the latter is a *complete* synthesis of content representing the *totality of the experiences* with each body (is a super-synthesis with the former, of content corresponding to experiences particular with each body and representing its differentia).

Finally, that the proximates here described are not myths, is indicated by the fact that the sensory fore-warning signs are synthesized not with the percept-constant as a whole, but *with each proximate separately.* For, from the fore-warning signs, I can tell what will be the contact-experiences with that aspect of the thing represented by each prox-

[24]Practically, it is this class of experiences that apprises us of the presence of matter; in absence of these experiences, we are, in general, unaware of its presence. The philosophically anomalous position of *gases,* has received little notice. Possessed of *properties,* they are *things,* but lacking extension and figure, *in no ordinary acceptation of the term,* can they be *objects!* Indeed, their momentum effect (as with "wind") apart, most "gases" give rise to no sensations ("have no qualities"),—a certain number affect the olfactory sense; a few give rise to color-sensations. Finally, except in the sense of chemical substance, what *is "a* gas," what *meaning* have the *words?* Mere way of saying: Matter *in the gaseous condition;* the only *unities* present, are the individual molecules, and the "gas" is an *aggregate,* without form or individuality.

[25]Developed later as Theory of Relations, when I shall try to show that (1) four conditions belong under one category, namely, instincts, feelings, *attitudes of organism toward* (this or that situation), and intoxication-motivation: (2) the mode of origin was through trial and error, learning and elimination of the unlearning; (3) when following rise of introspection, the content expressive of these conditions, came to be viewed *as content,* it became "relations;" and (4) kinetic interaction has nothing in common with relations. Meanwhile, I reluctantly use on occasion, this vaguest of omnibus terms, for want of a word.

imate (character of material, of its mode of aggregation in the particular body, the last's degree of "solidity.").

II. Sensory fore-warning signs—In crawling (walking, etc.) to the table, when the latter is reached, it always turns out to have the same contact-characters, *whatever were the visual fore-warning signs* corresponding to various angles of approach. Wherefore, *all* these sensory variants *equally* prove to pertain to the single percept-constant, through reference to the contact-experience represented in which, they are *unified.*

Besides these constant experiences, there are present with each body, "secondary qualities" (especially colors), particular for it, and contributing to the object-construct, differentia. These are, in general, inconstant, (color varying with illumination), and are functions of sense-inappreciable conditions of the thing.

This sensory content is, as Berkeley showed, purely reminiscent-prophetic, of what the contact experiences would be were body-surface approximated to the thing. For, when we make objects out of visual forewarning signs which are not reminiscent-prophetic, we make botches,—not having had opportunity to *handle* clouds, and thence to relate all fore-warning signs to resulting constant contact-experiences, the cloud is a *pseudo*-object, made by illegitimate transference of experiences which *happened* to be associated in another context; and a landlubber may mistake a cloud-bank for land.

III. *Ad-personal relations.*—With the foregoing experiences, come to be progressively assimilated, a "marginal fringe" of ad-personal relations ("meanings"), principally associations expressive of uses *to which the subject puts* the thing; but which have no more connection with things *qua* things, than purchases made with gold, with the gold *qua* gold.

Nevertheless, as one instance of man's overwhelmingly ad-personal philosophy (philosophy *of man,* not of the cosmos he inhabits), things are usually classified with respect more to their *uses for him,* than to their own natures. Thus, "table" covers a wide range of matter-aggregates, whose only unity is unity of use, material, mode of aggregation (number of legs), form (consistent with putting something on), varying so widely, that some tables approach nearer to some "desks," than to other tables.

Conclusions from Chapter VIII.—No peculiar mystery attaches to perception; none that does not attach equally to all association by contiguity, of which perception is special case.

ADDENDA, RÉSUMÉ, AND PERSPECTIVE.

The only irreducible universe-magnitude of whose existence there is evidence, is *substance;* its disequilibration-aspect is *energy. Change* of substance comes about via Critical Sequence, (5,21), at junctures marking intersections of curves representing independent variables (temperature and pressure, *e. g.*). Whereas, a body (steam) retains its identity for a long distance down the temperature-decline, suddenly increment of energy-extrusion no larger than a hundred efficacious predecessors, and body and "qualities" vanish together, and are replaced by another body (water) having in common with the first, certain compositional values, but with properties different to the extent

that energy-extrusion entered as factor in the formative sequence.

For each particular set of constituents (H_2 and O, *e. g.*), energy-extrusion and correlative densification are specific, and to the critical extrusion-densification, corresponds change from properties-constitution of constituents, to properties-constitution of compound.

In the environment of higher animals especially the human, substance occurs chiefly *in forma* things-in-themselves, which from previous non-existence (as such), leap into existence through metamorphosis of antecedents, through unification and individuation via Critical Sequence ("process of becoming"), in connection with the critical energy-extrusion. Each thing thus becomes a true unity; but besides these, man has made a lot of pseudo-unities, by regarding aggregates as unities, because of unity of use (for him).

From the standpoint of its effects upon us, the thing is a congeries of properties; from that of its own nature, a congeries of molecules, these of atoms, these of electrons, and these (*fide* Lodge) of ether. No thing is possessed of "qualities."

The thing-as-experienced-by-us (object) is a congeries of "qualities" and experienced relations. Its "unity" is only way of saying that the "quality"-congeries is constant, which means: The sensations experienced from the thing, are constant. But this means: Both sensation-generating factors are constant, and in particular, the environmental factor is constant. Whence, "the object has unity," is mere way of affirming *constancy of properties in the corresponding thing,*—which given, we have (synthesizing), constancy of resulting sensation (which *includes constancy of conjunction*), provided only the *organismal factor of sensation* remains constant. Where this varies (as where iron is successively, cold, warm, and hot, but all the while regarded as "the same" iron), the "unity" is construct got at like "primary qualities," *by partial synthesis,* synthesis of the "quality"-constants to neglect of the quality-variables,—iron appearing always "hard" but only sometimes "cold;" of the iron object-construct, "hardness" is an "essential" ingredient, while "coldness" is only an "accidental" feature.

Between things-in-themselves, subsists kinetic interaction only; relations have no existence between things. Besides, if "related" at all, a thing would be so only to its own past (genetically), not at all to its co-existents.

In the forefront of philosophic assumptions, are two: That consciousness is irreducible existent; that the criterion of matter, is "extension." If sense-appreciable, extension does not apply to gaseous, if sense-inappreciable not to solid matter. But not coextensive with matter, extension is no criterion thereof; and it is only way of saying surface, as shown by its co-extensiveness therewith.

"Qualities" are of two kinds: Irreducible or "secondary;" and reducible or "primary." Each irreducible quality is synonym for a sensation, and is a function of (and therefore representative for) a matter-property.

Primary qualities are reducible, successively, to: Surface-"extension," impenetrability, and sensations (chiefly dermal) associated, the last being the mental irreducibles.

"Qualities" are not in things, or the refluents therefrom, or the peripheral neurone-tiers of the organism; they *originate* in the highest

tiers, from something-not-quality in the lowest. The facts of Chapters VI-VIII, are fatal to Neo-Realism, infinity of chances precluding existence of two quality-series (in thing, in subject), corresponding term for term, yet disparate, without corresponding series in the intermediate linking zone (of refluents and peripheral neurone-tiers). And consciousness is not coextensive with (1) the cosmos; (2) living matter; (3) the nervous system, even,—it arises in dependent connection with a part only of the last, the cortex cerebri, and is thus intracorporeal.[26]

Though a prerequisite for study of any set of phenomena, is its delimitation from other phenomena, twenty-five centuries' discussion and a literature bulkier than any save theological, have failed to settle even this preliminary, the present day philosophers being as far as ever from concensus. "O but, the problems are so complex." They're made so. The simplest solution mustn't be accepted; only one having ulterior value,—most of the philosophers aver it must be "satisfying to the religious-ethical consciousness." But facing the blank empirical fact, Properties *are constant, how are you to tell anything as to psychoid conditions on their jenseits!* The epistemologic (the psychocentric) universe is, indeed, a Ptolemaic onion, with three concentric spheres:

1. The *introspective,* the sphere of *qualities-relations; knowable* (experientially); field of psychology (*parte* introspective observation), mathematics, logic.

2. Sphere of *properties* (and substance-energy, generally); *knowable* (extra-experientially); field of psychology (*parte* sense-observational—other-human and animal psychology), and of (psychology *in forma*) physical and biologic sciences.

3. *Jenseits of noumena; if existent, knowable only via ultimate*-philosophic methodology, whatever it may be[27]; Subjunctive Land, Land of Infinite Possibilities of May-be.

At any rate, it is the *jenseits of noumena, not* that of phenomena (mental appearance), which is the field of Ultimate Philosophy; and existence in the penultimate (accessible) universe, of human-like mentality, can be established only by pointing to human-like activities therein (as such activities warrant ascription of such mentality, to our fellows and the animals).

But properties being constant, organisms either (1) become extinct; or (2) survive by reason of development via trial and error, of capacity for motor response, along with which development goes *de fac-*

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[26]But mind is not *in* brain, or in space at all,—viewpoint (no evidence cited) of Ladd (Ladd & Woodworth, *Elements of Physiological Psychology,* New York, 1911, pt. III, Chap. I).

"In:" Prisoned within,—as a snail in a box.

"In:" Inhering in, immanent in,—as properties in a thing.

If the first consciousness ("mind") is, indeed, not in brain, but *no more is never-energy,* both continually interchanging with other energies. But if the second, the evidence is that nerve-energy is "in" brain, likewise consciousness.

"In space:" Forming part of the body of *oriented* (and mostly extracorporealized or objectivated) mental states.

"In space:" Pigeonholed in a *compartment of a circumcorporeal region.*

If the first, consciousness *parte* sensation-order content (sensations, percepts, "primary qualities") and pain, is "in space." If the second, the evidences here adduced, go to show *such* space myth.

[27]The only canon thereof I know is: Get enough people to *agree to believe in* this or that (witches, *e.g.*), and while they continue believing, the ultimate-philosophic creation exists; let them quit believing and *no evidence* having been involved in its setting-up, *no disproof* is needed for its down-tumbling, it just goes out of fashion (Lecky-Huxley law of decay of beliefs).

to, growing mentality. Such an organism *become introspective* (become human), however, finds *correspondence between* environmental sequences and its mental sequences. But coming (for reasons below) to objectivate its sensation-order content (sensations, percepts, "primary qualities"), and not at this stage in its evolution, discriminating over nicely between that and other (thought-feeling) content, it tends likewise to objectivate the latter. And tendency thereto is strengthened by observation that environment works as does its mind,—by acting on anticipating mental sequences (75 note 1), it circumvents threatening environmental situations, which turn out as mentally forecasted. But its workings being accompanied by consciousness, environment's are, too,—ejectivation, into cosmos. All this, however, traces back to nothing larger than, and all we know is the blank fact that: Properties are constant. And whatever conclusion that fact taken as premise, may or may not warrant (question for Ultimate Philosophy), "the *penultimate* universe is rational" is reasoning in a circle, and in a circle from its wrong end,—"reason" (human reason), derived from environment, is now turned round, superimposed thereon, declared to fit, *"the universe,* therefore, is rational!" But the inference, natural enough for emerging man, is view through telescope reversed (*Eidolon Malgheridanum*),—self big; cosmos small, and made for him.

Allocation of "qualities" shows that the line between matter and mind, is the line between properties and sensations ("qualities"); it has naught to do with extension. With rectification of the matter-mind boundary, goes extensive reapportionment of the shares contributed to knowledge, by environment and mind, respectively. Much that passes for mental creation, is incident of environment, while much that passes for matter of environment, is mere mental elaboration.

Consciousness, not "novelty."—Since advent in the phylogeny, of consciousness *in forma* sensation, cannot be proved novelty (Chapter VI), claim that advent therein of consciousness *in formis* thought and feeling, constituted novelty, requires evidence showing (1) in what the case for thought and feeling, differs from that for sensation; and (2) in what different sense advent in phylogeny constituted novelty, from that in which every-day advent in every ontogeny, constitutes it, —where consciousness arises (our theory says) when integration of structure comes to involve the critical relation. Moreover, it being in the nature of the case, that the result of *every Critical* Sequence arises suddenly *de novo,* with characters qualitatively incommensurate with those of antecedents, every such result is a "novelty," and that of no one sequence more than that of any other. Wherefore, if consciousness shall be peculiar novelty, it must be by reason either of its not being critical phenomenon, or of considerations others than previous non-existence, sudden emergence, and qualitative incommensurateness with antecedents. And pending adducing of such other considerations, the "potency" of consciousness may be assumed to have been as much in its antecedents, as that of water in its,—"potency" meaning only: *De facto giving rise to.*

Consciousness and energy.—It is fashion to exhaust hyperboles in vaunting the hiatus between consciousness and other existents. The criteria relied on have no value whatsoever; and the methodology that bases zenith-nadir difference upon difference *of characters, is empty!* If consciousness is energy, the contention falls (ex hypothese); and if

it is not, *no conditions exist under which comparison is possible!* For, then energies are not represented as such "in" consciousness, but only *in forma* the resulting sensations, which are consciousness. "Consciousness is, *O,* so different from energy," can, then, only mean contention that it is not undulatory. But the only way we know energy is undulatory, is through interference-phenomena; and the only way we know these, is via sense-organ activity. Consciousness is, however, not observable via such activity; whence, all attempts to bring the two to terms of a common standard for purposes of comparison, fail.

Canon of exegesis.—When one energy-species is replaced by another, the evidence on which congenerity of species rests, is not (fancied) similarity *of characters* (which, in the nature of the case, are never in terms of a common standard); it is evidence that *as matter of fact,* every vanishing of the one species, is attended with emergence of a constant ("equivalent") amount of the other. And with consciousness and environmental energies, in particular, no observation-conditions existing under which they are comparable in common terms, to the question whether consciousness is or is not energy, notions as to zenith-nadir differences *of characters,* have no relevancy. The *only* evidence pertinent, is that showing whether as fact, emergence of consciousness is dependent upon antecedent existence of energy, and whether its subliminal recession is attended with emergence of other energy-species (whether it *does work*).

And, generalized: The facts of alternation of generations, metamorphosis, and all embryology, demonstrate that "differences *of order,*" if not myth (as they most likely are!), cannot, at any rate, be proved from unlikeness *of characters,* such unlikeness being criterion of difference, only where it has been ascertained to be *index of non-intergenesis.* Thus, consciousness *if* different from energy, will be so because of non-interchange; and man differs from star, not because he has a backbone which star lacks, but because *of the further fact* that, empirically, men do not give rise to stars, or stars to them (remoteness from common origin, finding expression in non-intergenesis).

"O but, consciousness is directive" (of energy). In Chapters I-III, is shown a way in which energy (consciousness as energy)[28] may "direct" other energy, *re*-actively and automatically, by reducing neurone-resistances, with the result that certain neurones come to be stimulated rather than others. So that no fact exists prejudicial to supposition that consciousness is energic; the question is solely, fact of interchange,—yes or no. And against such supposition, no objections can be urged on ground of introspection,—of difference in appearance. For, unable to compare consciousness observed introspectively, with consciousness observed through sense-organs, no one knows *how much* difference, difference in observation-conditions, entails; it may well be just the amount that appears to exist. And complementarily, no one knowing how an environmental energy-species would appear if observed introspectively, it might well appear as consciousness does. If, then, consciousness *appears* unique in the universe, it is not (as far

[28]Though nothing so far shown, excludes the possibility that consciousness may be *increment-to-increment correlate of* energy ("thermoid" energy) rather than energy itself, it will become increasingly apparent that that possibility is *needless profusion* of hypothesis, leaving consciousness hanging in the air, without office or *raison d'etre,* just where present theories have it, in fact.

at any rate, as evidence is forthcoming) that it *is* unique, but only that the *conditions under which it is observed,* are unique.

That, now, a common "Something" results in different sensations in different individuals, proves consciousness *in forma* sensation, two-factored resultant. And supposition that consciousness *in forma* thought is two-factored (1) finds support on ground of the carbon basis of nerve-substrate (65,79); and results in (2) accounting for the quantitative anomalies in the interchange of consciousness with other energies, and showing how consciousness satisfies the conservation-equation, by doing work.

"Knowledge."—But consciousness *in forma* sensation two-factored, the epistemologic quandary enters on a new phase, existence of sensation guaranteeing existence of both sensation-generating factors, in particular, of the environmental factor, *energy.*

Knowledge is of two kinds: Experiential (knowledge of conscious states and their interrelations); and extra-experiential (knowledge of the ante-conscious factors). The first is immediate, the second fundamental; and science works back from the first ("observations") to the second (properties), because these alone are universe-*constants,* with which alone can we work along, link to link, assured that at any link we can transvaluate back into sensations, thereby "verifying" the work. And properties are universe-constants, because they are functions of changes *far enough back along the genetic line,* completely to underlie present-temperature ("present-day") conditions,—functions of the *atom-formative* critical sequences; consequently, constant[29] for inhabitants of an *atomic* universe. Science is thus: *Progress from experiential to extra-experiential knowledge.*

Though confessedly we must, in the last analysis, write up, *ignoramus,* it is as well to know what it is we don't know, and it is: How everything began, and the Ultimate-Philosophic problem ("mystery") is the origin or ultimate finality of substance-energy. For, given substance and energy what we empirically find them, the subsequent manifestations (mental, vital, physical) appear to follow as consequence of that "given",—and scientific methodology suffices.

"But are not substance and energy equally mental constructs?" To be sure; they will be described as such,—which is, however, not *the* question.

Canon of exegesis.—There is nothing in the nature of a mental construct that compels, and equally nothing that forbids the existence of an extramental reality corresponding to the construct; whether such correspondent reality exists, is question *of fact, separately* in each case.

And there is no evidence of an extramental reality corresponding to any construct, *save only to those of the substance-energy cycle.* But that things exist extramentally, is no reason that "space" must also so exist; that is *separate question of fact* (with evidence adverse). Conversely, that space is purely mental, is no reason why things must also be; that, too, is separate question of fact (with evidence adverse). Indeed, it is because things are extramental existents, that space has arisen as a mental existent.

Tridimensionality no mystery.—Mere incident of fact that there is but one simplest classification of moments impinging on organism. The

[29]Phenomena of the radio-activity order, show the constancy approximate only, and the "elements" merely very stable compounds.

"vertical dimension" is directly given in environment, is only way of saying, "Gravitation; it is counter-real mental construct, corresponding to the axis of inequality of centripetal-centrifugal moments (which are in environment), along which, consequently, practically all animals *and plants* have become differentiated (dorso-ventrally). It is not a Something, "Dimension," part of an Extramental Reality, Space-in-Itself; for *at no two places on the earth, is it the same*,—there is no universal, single (no *a*) Vertical Dimension. As empirical fact, it is equally divided by the water-level,—but separately, for each place,—no universal Horizontal Dimensions.

The last are gotten from environment. With attached organisms (plants, most coelenterates), all-predominance of 3- or 5-radiate symmetry, shows that where it is question only of moments *impinging upon* the organism, any one of several symmetries, suffices. But the all-predominance where the animal's *body itself* moves, of cephalization and bilateral symmetry, shows that there the principle of least action finds expression in structure (and consequent mentality) involving *limitation at each instant, of choice of reactions, to alternatives*. (Or, otherwise put: It shows that for moving organisms, the condition for optimum composition of organismal forces reactive to impinging environmental forces, is equality of forces on the two sides of a median line of points of application (supporting skeletal structures.) And as fact, every day and hour, every motile organism is learning to choose between advance and retreat, turn right and turn left,—both cases reducing to the latter. Thus it comes to recognize, as mutually excluding reaction-possibilities, the semicircles on either side of its median body-plane, irrespective of how that plane is in reference to external things, —"direction"—*data* (*with subjective reference*) present; conceptual systematization of them, lacking.

Assumption of the erect posture,[30] involves very favorable conditions for that systematization. Man's outstretched arms subdivide his horizontal circle, quadrantially, and many environmental conditions almost force quadrantial division,—sun's east-rising and west-setting, and crescendo to and descendo from "meridian," resulting in cardinal points, reinforced by climatic differentiation and migrations of food-animals along the north-south line, etc. But it is no necessary subdivision; were my cerebrum distally in connection with the 5-radiate bell of a jellyfish, I should think the fifth of a complete revolution, as fetish as now the fourth.

"But man's horizontal was pre-man's vertical." True; and Kant, abreast the science of his time, would to-day not say, Man *has evolved* to erect, and also say, "space is an *a priori* form" of mentality, meaning, Mental complex that cannot be unlearned and re-learned another way. For, had "space" been such form, pre-man could never have become erect; for each separate individual would then have found it impossible to orient himself, save on all-fours. But he did become erect; therefore, space is learned separately by each individual. In sharpest contrast, stands an actual "*a priori* form," the adolescent

[30] That man originated as quadruped, is shown directly by the anomalous distribution of valves in his veins, and by his *frænum præputii*, neither of which could have evolved in his present posture. Present in intercostal veins (where now not needed) and absent from vanæ cavæ (where needed), the valves become intelligible immediately man assumes all-fours (Baker, *N. Y. Med. Journ.*, Oct. 22, 1887). And the frænum which now operates to withdraw meatus from, *in coitu a dorso* approximates it to os.

psychosis; had that had to undergo change, that pre-man might become erect, he never could have become so. And accordingly, in *that*, pre-man and man agree.

Besides, *where "in Space," are* these Dimensions,—say, a Prime Vertical, with which earth coincides, momentarily, twice in its annual round, acquiring Verticality enough to last six months; and why hypostatize Dimension, and not equally Equator and Meridian? And how would a Pyrozoan learn them, in an all-gaseous universe?

Relations of mind with noumena.—With progressive energy-extrusion, densification (22) has increased from the gaseous state, to emergence of (1) the Dintingness-Undintingness gamut, and (2) a sensibly "continuous" degree of molecule-approximation,—the moments underlying the liquid and solid states. From the standpoint of things, all three states are only successive stages in the one environmental genetic densification-series (of each body, separately), which began at least as far back as electron-unification to atom-unity. And that all matter now occurs in one of three states, is incident of the temperature-conditions we live under, since state bears no fundamental relation to constitution of bodies.

The mental series representative of the environmental, has not been coterminous with it, but first became possible when (and actually arose long after) densification had progressed to emergence of a sense-appreciable degree of molecule-approximation. For, as fact, the concern of animals with things, is primarily not with their constitution, but with their state. And it is to appreciation of the moments underlying state, that animals have become adapted,—through advent of sense-organs sensitive to them, and emergence of the *organismal factor of sensation.*

But bodies being innumerable, while states are three, it is *incident of environment* that many bodies exhibit the same moments, and consequently incident of environment, that with many bodies equally, organisms have (1) common experiences corresponding to moments common to bodies in the same state, while having (2) different experiences, corresponding to moments peculiar to each body.

Solids predominating in human environment, contact-experiences with them, come to form the ground-plan of the human's environment-picture, and with this ground-plan, are harmonized as well as may be, contact-experiences with liquids, which fit only with large qualifications, and those with gases, which fit hardly at all.

Sensory experiences with things, are of two main kinds: Contact-experiences; experiences reminiscent-prophetic of contact-experiences. The first are fundamental (as also phylogenetically older). They are all dermal, and are of two types: Experiences of secondary-quality type (*C*, above), apprising of *kind of material;* and experiences of primary-quality type (*A*, *B*), apprising of *way material is conceived as disposed,*—the latter consisting of either experiences peculiar with each body (*B*), or common with all bodies in the same state (*A*). The last experience is: Inability to move through, which is association-product of three lines of dermal sensations.

Synthesizing, then, from the bottom: Dermal (and other) sensations become associated (by contiguity) to the motor-sensory contact-experiences, Can't move through, Can move along, which taken together, are "surface," for which "extension" is other name. And super-synthesis occurs, as regards: (1) Way surfaces are conceived as disposed ("fig-

ure"); (2) amount of effort expended in encompassing thing ("size"); (3) secondary qualities, apprising of kind of material,—supersynthesized to percept-constant. With this, finally, are super-supersynthesized: Sensory fore-warning signs (secondary qualities); and ad-personal relations ("meanings"), largely of uses for (subject). Thus is created my "world of objects," which henceforth represents my thing-in-itself environment, *from the standpoint of my experiences with, and therefore reaction-needs to* it.

In the percept, sensory fore-warning signs are purely reminiscent-prophetic, and where not so, indicate—just nothing. For, the habitual concomitance of primary and secondary qualities, is mere *incident of environment,* of the fact that tangible bodies in general reflect light. But the concomitance is no "necessary" one. Glass models of furniture, immersed in liquid of the same refractive index, would (being invisible) "have" primary qualities without secondary; and clouds have secondary without primary (were we to "get to" the cloud, there would be neither cloud nor color).

Objectivation.—The question remains: How did *sensations of the organism,* ever come to be regarded as "external," as belonging to external "objects,"—why are some mental states objectivated, while others are not? Premising from later discussion (motion, ego synthesis): Things are actual extramental existents. But, as empirical fact, I attain to contact-experiences with them, *only sequent to travel-effort* (at least movement of limb).

I must travel to reach "external bodies."

I *regard as* "external," bodies I must travel to reach.

The second alone, is mental construct. My universe is studded with "near" and "distant" bodies, whose assigned distances represent solely the amount of travel-effort needed *on my part,* to bring body-surface in contact with them. And "outside of" and "beyond" me, have no other assignable meaning than: *Tangible only sequent to travel-effort.*

But contact-experiences accruing only sequent thereto, the several *constructs embodying them,* come to be objectivated. What should have been concluded, was: The *source of* (environmental factor in) them, is external. But it was inevitable that the solution of the "plain man", should take the form it did. For, the alternative explanation first becomes possible, following recognition that sensation is two-factored, a fact recognized by hardly any philosopher.[31] Besides, the plain man's solution, containing as it does, all data necessary for optimum motor responses, suffices for his needs (working, though not fact).

Thus mental states become differentiated into two opposed series, an "external" or object series, and a *residual,* "internal" or mental series. That this differentiation is secondary to experience with an *independently existent* thing-series, is shown by the fact that throughout practically all the mental-state aggregates called "minds," *just those states (content of sensation order) are accordant, that relate to the commonly experienced thing-series;* whereas in the states composing the

[31] The only one I have met in limited text-book reading, is Jerusalem (*Introduction to Philosophy,* New York, 1908, 66): "One thing at least, is certain, namely, that two essentially different factors contribute to the formation of our world images. The one is outside of us, self-active, independent and possibly persistent, *i.e.* the objective factor. The other is ourself, our senses, thoughts and feelings. This latter, which is of a transient nature, is the subjective factor."

non-objectivated series, widest divergence prevails ("individual differences," of taste, opinion, etc.).[32]

Why are "secondary" qualities objectivated? In general, indissolubly linked with the primary (every primary quality being ordinarily of some color or black-white shade—Berkeley), one rule of interpretation would tend to cover both cases. More particularly: Dermal secondary qualities being attained to only sequent to travel-effort, equally with the primary, these will be objectivated. And with visual secondary qualities (the most important), *environmental conditions* are such that during approach to a thing, secondary qualities progressively increase to constant maximum coinciding with advent of the contact-experiences. But so long as consciousness is entity, increasing to maximum coincident with contact, is harmonizable with the distance-construct built upon travel-effort, only through acceptance that the qualities are "where" they are ad maximum,—in the thing. With sensation two-factored, this is corrigible to: The source of the sensations ("qualities"), is in the thing.

Pain is not objectivated, because it does not occur in the objectivation-context, which is: Association-product the *constant initial* in which is *travel-effort to* a thing, upon contact with which, dermal sensations first arise. But pain arises in very variable contexts, and is usually unassociated with precedent travel-effort, often being experienced from intracorporeal sources, or from impact of things on body-surface. Moreover, the pain-context, with pain as the initial member, involves withdrawal from (of hurt part).

Objectivation of hallucinations.—Hallucinations are mental states become (largely, at any rate, through "abnormal" intoxications, as in delirium tremens) so vivid as to be taken for states *initiated through environmental stimulation* (sense-experience). That increase in vividness is (in many cases, at least) the feature involving objectivation, is shown by the fact that increasing environmental stimulation to the point of restoring the accustomed vividness-balance, results in disappearance of the hallucinations. Thus, delirium tremens patients will have light burning all night, lowering of which results in immediate reappearance of the hallucinations.

The states objectivated are all of the percept order. Consequently, given (as in delirium tremens) increased vividness of visual forewarning signs which when originally experienced, stood in association with necessity of travel-effort as prerequisite for attaining contact-experiences, we have objectivation of the hallucination, as originally objectivation of the "real" object-construct. And there is no more reason for marvel at the hallucination-objectivation, than at dream-objectivation, which equally is largely outcome of unhabitual ("abnormal") intoxications. The strange feature is the patient's inability to correct the hallucinatory objectivation, which, too, is incident of intoxication-derangement of habitual mental relations ("function"), and also is usual in dreams.

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[32]And even the extent to which the non-objectivated series exhibits likenesses among different individuals, is referable back to *common environment*,—likeness of feeling, *e.g.*, coming about as indispensable antecedent in motor response of common type (in co-specific organisms) in face of identical environmental happenings.

DEFINITIONS.

Underlying the definitions below, is the consideration that *in the beginning,* we have only our conscious data (experiences, observations); not, however, that consciousness is the only, or yet the fundamental existent, but that by reason of *the conditions involved in our knowing,* we perforce *start out from* it. But at least we have all of it, and no one part more than another. And taking it *all* (not nibbling our preference), comparison of one conscious datum against others, results in evidence that consciousness is *two-factored,* and that the factors are *energic,*—whence, existence of consciousness, evidences existence of *energy;* and further comparisons showing matter an independent variable, its existence follows from its interactions with energy. So that, we know our consciousness only more immediately, not more certainly, than we know matter-energy; and *our consciousness itself* proves unintelligible, save as a function of matter-energy.

The definitions are, above all, from the standpoint of *our experiences with* things (properly oriented, of *things' effects on us*), and are, thus, epistemologic or *linking* definitions, linking psychology and physics; final-scientific definition is for the physicist.

"Mind."—The organism's conscious states *viewed collectively and as pseudo-organized,* that is: The individual's total consciousness, including his thought (and feeling) *"habits,"* but his *thought*-"habits," not his psychoneural activities,—"pseudo-organized" referring to his *habitual* mental successions, habitual in dependence upon his neural organization, organization come about through both ontogeny and imprintation ("learning"). And the human mind is: The *introspectively revealed aspect* of psychoneural activity.

Embracing all content, actual and potential (revivable, on occasion), the definition includes the brain-organizing reactivities of consciousness, but excludes (as matter of brain-physiology) the brain-activities so organized ("subconscious mind").

GENUS *Energy.*—(1) From standpoint of its effect on us: The *permanent possibility of* consciousness. (2) From standpoint of its own nature, and fundamentally and initially: The undulation-state of Substance.

Species *thermoid + consciousness*: The only *experienceable* species. (1) From standpoint of our experience (introspective observation) of it: The *qualitied* (qualitied-relational) existent. (2) From standpoint of its own nature: Apparently energy-species generated through interaction of "nerve"-energy and "nerve"-resistance.

Species *heat, light* (etc.): Known *extra*-experientially only.

Now, indeed, energy occurs under other forms, as molar motion (stone thrown), etc. But these are evidently secondary and derivative. For assuming the ether the primordium, they not being modes of motion of it but only of electrons and matter, represent not primitive but subsequent energy-forms.

Energy is a Something *undulating in* the ether,—like a snake in water.

Energy is but name for *undulations of* the ether,—like waves of water.

Energy is undulation-state *of substance* (*in forma* ether), because the ether hypothesis is built upon energy (what "ether" means is: Undulation-interference *substrate*), and affords substrate for every

transference of energy, from and to every known body. If, then, energy existed otherwise than as undulations *of the ether* (and energy-forms derived therefrom), we could not know the fact, and such Energy would be at once, the Great Unknown. Whence, all energy known to us, exists as undulations *of* the ether (or as derived forms). But the ether is not continually undulating (in every part, at least). I see in a dark room, an electric spark every tenth second; therefore, 9.999 seconds out of 10, the ether is "quiescent" (subliminally undulating, at any rate),—meaning what? Sufficient to emphasize that *the* universe-problem is the origin or ultimate finality of substance *and of its disequilibration.*

The italicized portion of the generic definition, is the Realist's Archimedean fulcrum, his open thoroughfare from out the Idealist's labyrinth. Certainly, J. S. Mill's definition of matter (permanent possibility of sensation, here widened to cover consciousness in general), should be transferred to energy, sensation-genesis being, like all *change,* energic. The permanence will come up later.

GENUS *Substance.*—Energy-equilibration *substrate* (energy-transference substrate, "transference" meaning, From body to body, not "place to place").

Species *ether*: *Undulation*-substrate; all-pervasive ("omnipresent").

Species *electron:* Atom-constituents, all alike, negatively electrified; probably cospecific with matter.

Species *matter:* That which *selectively* modifies energy,—"selectively" denoting the *specific* absorptive (etc.) capacities inherent in each matter-species, in virtue of its molecular constitution (of its past specific energy-extrusion, *i. e.*). In briefest, matter is: That which *has properties,*[33] these denoting: *Capacities for* selectively modifying energy.

The definition of matter includes (as the greater, the less) the definition, That which *is moved* (has "inertia"); for in being moved, matter-species selectively modify energy. And Mill's definition seems not to lie, as Pearson (*Grammar of Science*) holds, in a direction away from, That which is moved. Rather, it is just because matter is that which is moved, sensibly *and insensibly,* that it is the permanent possibility of sensation,—source of energy-modifications, each specific for a particular matter-species, and consequently inducing sensations correspondingly specific therefor, sensations called "its qualities," because experienced always and only in connection with that species. Finally, both definitions mean the same as Maxwell's: That which has energy communicated *to it.*

Impinging energies undergoing absorption specific for each matter-species, the effect-inducing energy-values given off from a body, are a function (indeed, the obverse) of its absorbing-capacity,—of a property. And each sensation being a function of an effective energy-value, we may define:

"Quality" (irreducible).—*Synonym for a sensation;* a mental state

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[33] Might it not be added: *impact*-substrate?

The other energy-species, too, have properties (with modified definition, however). Thus, ether has capacity for undulating, is mere alternative statement of: Is undulation-substrate. But their properties are too little known to effect the fact that matter is *the* species we deal with, that to which our sense-organs have become adapted,; so that practically and for us, it is the property-possessed species, *par excellence.* Besides, most important now, is to emphasize the property-quality antithesis, which concerns matter alone.

which is a function, immediately of an effective energy-value, but ultimately of a *property* of a thing-in-itself.

"Space".—Mental construct embodying *systematized* synthesis of motor (chiefly locomotor) experiences in a *"surfaced"* universe,—experiences which in one aspect, sum to "surface;" in a second aspect, to "distance;" in a third, to "direction."

Then spatial relations *of the organism,* are objectivated,—*to extramental realities! The empirical fact* that one body is not two bodies gets the double metaphysical twist: No body can be *in two places at the same time. And the mere fact* that a body exists (which includes, in absence of destroying moment, persists), is rendered: Every body exists "in space and time." But mind is imposed on environment, whenever *relations* are objectivated, and no evidence warrants this hypostatizing of space and time.

Traditionally lumped together as "mental correlates," space and time have little in common beyond the fact that in the genesis of both, "motion" (of something) is involved. But motion and time are closely linked concepts; are, in fact, only different ways of viewing change.

Consciousness is said to have but one dimension. Waiving wrong use of "dimension," that is all environment has! This is a genetic universe; and all "change" in it is *serial,—separately*, with each body. And the statement, Mind parallels environment, should be restricted to: Mental *sequences* parallel environmental *sequences.* Much mental representation is not paralleling at all. It is weaving of a web transversely over the exposed discrete terminals of environmental genetic descent-lines,—as if an insect crawled transversely over successive florets of a cyme, saying: *This is the real* world, ignorant of flower-stalk, tree-trunk, the earth and its cosmic history, of which the insect's world is but the latest ephemeral cross-section. And half current notions are similar mistakings of comparative-anatomical formulations, for genetic explanations, in a universe intelligble only as viewed along its energy-trend.

Summarizing this chapter-series in a sentence: What we call "our universe," is *the mental web we have woven over and taken for* the extramental cosmos, which in itself is utterly different, being de-qualitied and de-relationed.

Complementary to the incompleteness of this chapter-series, is this program of future work: Proof of existence of noumena; description of noumenal world (as de-qualitied and de-relationed); energy in that world; its insensible form, and interchangeability of that with its sensible form; from latter, origin, via trial and error, learning and elimination, of "motion" construct, as construct taking account of variables in motor situation; similar origin of speed construct, as that taking account of variables in motion, from which, following rise of introspection and analytic decomposition, was derived the "time" construct.

P. 226, omit sentence "One qualification only."